Nature Magazine

VOLUME 34 NUMBER 7

AUGUST-SEPTEMBER 1941

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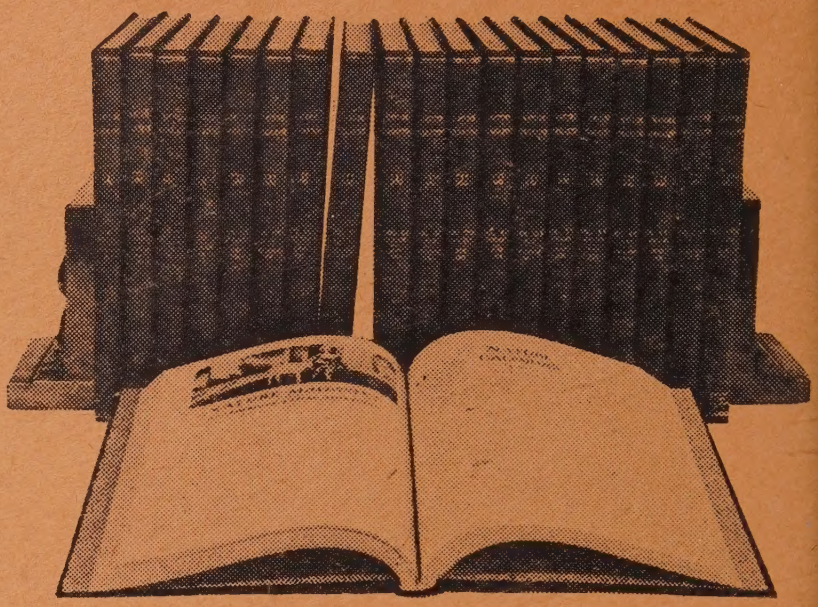

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What state has more than 10,000 lakes?

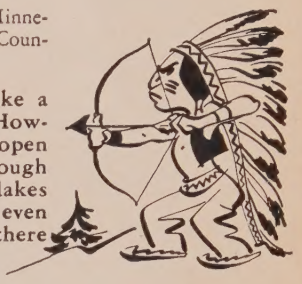
ANSWER: Minnesota, with 11,007 lakes . . . and practically every one full of big fighting muskies, bass, pike, crappie or trout! Try your luck?

Q. What great American river system has its source and headwaters in Itasca State Park in Minnesota?

A. The Mississippi. The old Father of Waters is so insignificant at its source, it's fun to roll up your trousers and wade across it in half a dozen steps!

Q. The Northeastern part of Minnesota is called the Arrowhead Country. Do you know why?

A. Because it's shaped like a huge Indian arrowhead. However, if you keep your eyes open while you're tramping through the woods and around the lakes in Minnesota, you may even find a real arrowhead left there years ago by the Indians.



Q. Minnesota's State Parks, largest of which is Itasca with 32,000 acres, attract thousands of tourists every year. How many State Parks do you think there are in Minnesota?

A. 37 — with modern resorts and hotels at most of them to provide for vacationists. And in many of them you can ride or hike for hours over a network of trails through the virgin forests.

Q. Golf is one of the most popular sports in Minnesota. And to accommodate all the golfers, how many courses do you suppose there are in the state?

A. 60 in all. And there's enough variety to satisfy the most exacting pro or divot-digging dub. There's a course close to nearly every resort in the state.

Q. Thousands of non-resident fishing licenses are sold every year in Minnesota. Do you know what the cost per license is?

A. Only $3.00 — and a non-resident family license costs only $4.50! After you've tried a few days' fishing in Minnesota, you'll say you got more than your money's worth!

Q. You probably know that Minnesota produces more iron ore than any other state, but what else makes the iron mines famous?

A. Practically all the mining is "open pit" — not underground —because the ore is so close to the surface. At the big Hibbing mine, you can stand on platforms and watch mining operations in the biggest man-made hole in the world!

Q. Greatest inland port in the world is in Minnesota. Do you know what city that is?

A. Duluth, at the head of Lake Superior and the Great Lakes. You watch special loading devices pour ore and grain into boats headed for the east, and you see automobiles and coal unloaded from boats just arrived.

Q. The Official 1941 Minnesota Tourist Guide Book, crammed with pictures, facts and costs of Minnesota vacations will be sent to you as soon as you write for it. What will it cost you?

A. It's FREE—won't even cost you a box top! Send today for your copy of this 36-page book. Write to Dept. N4, Minnesota State Tourist Bureau, State Capitol, Saint Paul, Minnesota!

Camera Trails

BY NORRIS W. HARKNESS

Picturing Pests

Nature photographers can do something that will be both fun to do and a real benefit to their community by making photographic studies of some of the pests found in the territory. Such studies will be especially valuable to children in cities and the larger towns, but with the cooperation of the authorities in the surrounding country they may be equally worth while anywhere. "Pests" is perhaps a queer word to describe the things I mean, but poison ivy, tent caterpillars and the like are pestiferous.

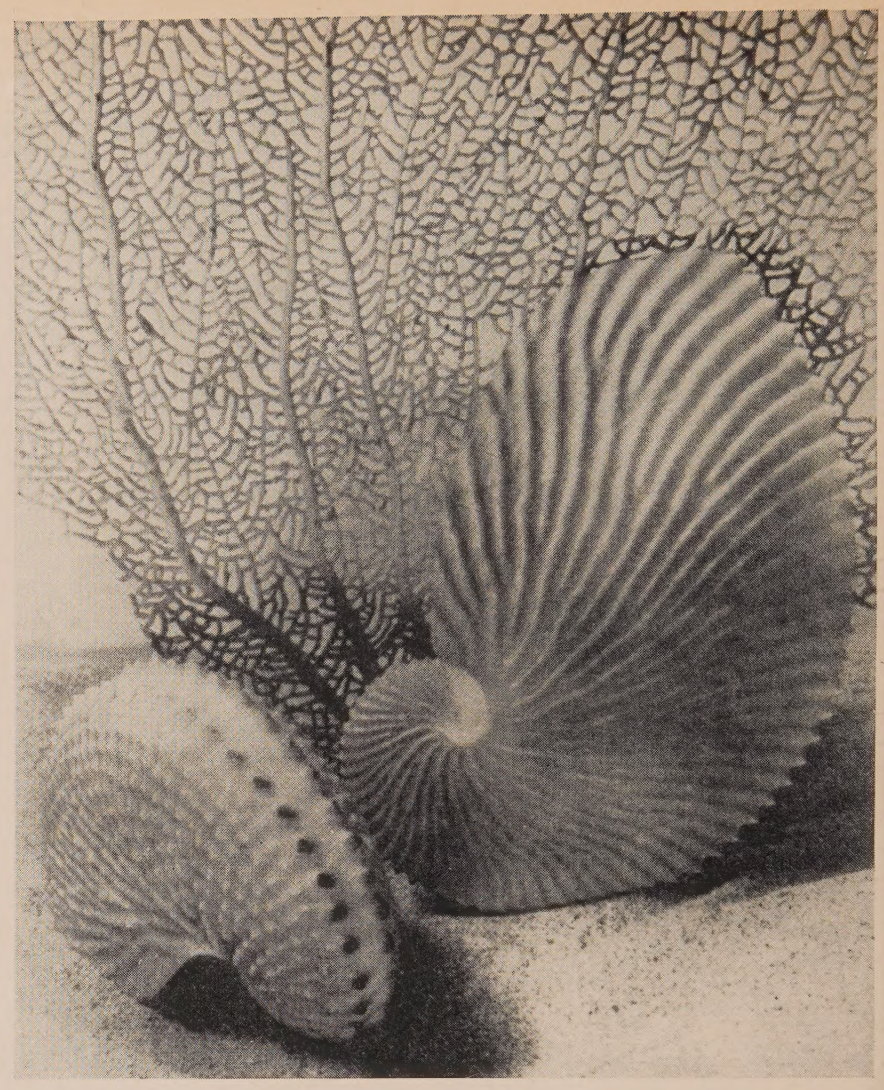
The plan is this. You have poisonous plants like poison ivy, poison oak, poison sumac, or your own particular pet picnic-spoiler. *You* know where they are likely to be found and just what they look like in every season. But there are many in your town who do not, and nearly every boy, at one time or another, comes home with face and hands testifying that he found the plants even though he did not know it at the moment. So you use your camera to show him and all his friends all you know about the itch plant. You photograph the kinds of places in which it is most often found, and you follow those pictures with close-ups of the leaves and plant in all the seasons in which it is dangerous. Then you add shots of the whole plant and make up a series of pictures that tell the entire story. If you want to be thorough, you will add more pictures showing how the pest may be eliminated from the garden wall, or the edge of the baseball field, and end the series with an accurate description of the plant, its normal habitat, its safe removal, and possibly several methods of helping those who did not see your pictures soon enough.

The facts of your story may be obtained from the library, or from your county farm or forestry agent, and you should consult them before you expose yourself to danger in making the pictures. Get your doctor to tell you how to treat affected parts, and, after you have all the facts, start shooting. For the pictures of the likely places, ordinary landscape technique will suffice, but you will have to watch the lighting when you shoot the plant or vine itself. A filter will help you very little unless the plant is against the sky, and removing other plants will probably be better than trying to make the poisonous plant stand out from its background by tricks of exposure. Side lighting will, of course, add depth to the pictures and give you the advantage of showing the plant away from its surroundings to some extent. The leaf cluster or the individual leaf will probably need to be shot from a very short distance—perhaps with a close-up supplementary lens—to make it big enough on the negative to show plainly. It does call for good photographic technique—all your pictures do—but the main thing is to plan the series carefully and then make each picture tell its part of the story.

When all the pictures are ready, mount them and the written parts of the story on uniform mounts and place them at the disposal of the proper teacher in your local school, or the local librarian. But here is a tip. Better make the whole show in duplicate because you are almost certain to be asked for more of them.

Now that you have started on such educational pictures, you might set yourself the task of shooting the history of one of the familiar pests like the tent caterpillar, and the control methods that the authorities are using to get rid of it. Such a series of pictures should spread over each stage of the pest's life and not only be a complete life history but also show what may be done to kill it at each stage. Again you will have to consult those who know all the facts, and the series, like the poison ivy set, should include an authoritative statement of everything you can learn. You should show the results of the pest's work with "before and after" pictures, and include as many close-ups as are necessary to make it perfectly recognizable in every form.

Photographically, such a series is like the ivy one in that each picture requires its own technique, but no such shooting will bother you if you approach each shot as a separate problem that may be solved by the simple rules of your regular work. You will enjoy doing these pictures and be proud of their reception.



"NATURE PATTERNS"—Photograph by Mrs. Grace Balientine of Upper Montclair, N.J., which won first prize in the decorative class in the Third Annual Salon of Nature Photography conducted by *Hobbies*, the publication of the Buffalo Museum of Science

This and That

The Photographic Society of America has started a Nature Section that has announced a Nature Salon to be exhibited in Chicago in connection with the P.S.A. Convention at the Hotel Stevens on October 24, 25, and 26. The Salon will be divided into four sections, zoological, botanical, technical, and series pictures, and an entry fee of one dollar must accompany your entries, which will be accepted up to October first. For entry blanks and details of the four classes, write to Russel Gray, 1530 Locust Street, Philadelphia, Penna. This department is going to be badly disappointed if ninety percent of the prints accepted do not come from NATURE MAGAZINE photographers.

Afga Ansco's new fine grain developer, Finex, is excellent. I have used it for nearly fifty rolls of film and recommend it highly in every way. The negatives have sparkle and fine gradation and can be enlarged at least as far as with any developer. The replenisher method—adding new solution for each roll developed—insures uniform results without increasing the developing time. You will like it.

Agfa has also issued a new booklet, called "Choosing Film for Your Camera", that con-

tains practically all you need to know about films and development. It was published before Finex came out, but the 25c the booklet costs will be well spent.

Burke and James 223 West Madison Street, Chicago, Illinois, have issued a new catalog with an insert of the B & J Press Camera. Their booklet on enlarging has been revised. If you have not already obtained your copy, write for it to the above company. Do not forget to mention this department.

The Raygram Company, 425 Fourth Avenue, New York City, have put out a new product that helps to dry either roll or cut film rapidly and evenly. The new material, Textilex, is a clean, lint-proof absorbent paper in which you roll up film and leave it for a minute. All surface water is absorbed and the drying is hastened. Write for their catalog and mention Camera Trails.

The New York *Sun* has issued a booklet called "Let's Make Pictures" that takes up some twenty-five of the more common photographic errors and their correction. In addition there is a story on the general problems of making pictures, and another on shooting color. The whole booklet is planned to help the less experienced worker. For your copy send a three-cent stamp to this department.

Camera Trails is granted space in NATURE MAGAZINE to help amateurs make better pictures and, hence, get more fun out of their photography. To that end Camera Trails maintains a service to help solve your photographic problems. Simply address your questions—your suggestions will be welcome, too—to Norris W. Harkness, NATURE MAGAZINE, 1214 Sixteenth Street, N. W., Washington, D. C.

The Problem Corner

C.A.M., East Detroit, Michigan, asks: "How can I copy prints after the negatives have been lost?"

ANS.—Copies may be made either with an enlarger or with an ordinary camera and the procedure is nearly the same in either case. The prints are held flat and perpendicular to the line of the lens. If you use an enlarger, put in any negative and focus it on the print, leaving just a little room around the edges of the print. Then stop the lens down all the way, shut off the lights and place Commercial Cut film in the negative holder just where the focusing negative was. The lights—ordinary desk lights will do with 40 or 60 watt bulbs—should be equidistant from the center of the print and a line from the center of each bulb should make an angle of 45 degrees with the print surface. Placing them at about two feet from the print will lead to an exposure of about twenty seconds with 40 watt bulbs and a diaphragm setting of f/11. The lighting plan should be the same when you use a camera, but you may need a close-up supplementary lens to get a large enough image on the film. This has been covered in more detail in a previous issue of Camera Trails.

J.H.R., St. Paul, Minn., says: "I have difficulty in getting enough contrast in my negatives though I measure the temperature carefully and develop for the recommended time."

ANS.—The degree of contrast in a negative depends upon the temperature of the developer, the time the film is in the solution, and the amount of agitation it receives during the process. It may be that your thermometer reads higher than the actual temperature with the result that your developer is colder than you think, or perhaps you do not agitate the tank sufficiently. Most time figures are based either on continuous agitation or on shaking the tank for ten seconds in each two minutes. The continuous plan is safer. It may be that your exposures are too short and the negatives, therefore, too thin. Try a series of exposures, as has been recommended here before, starting with one-quarter the meter exposure and doubling the exposure with each one until the last has four times—at least—what the meter calls for. The first might be 1/200th at f/8; the next 1/100th; the third 1/50th (as called for by the meter); the fourth 1/25th, and the last 1/10th. One of the series should be better than the remainder after you see the prints.

Miss E.M., Houston, Texas, writes: "I would like information on screens for still and movie projection."

ANS.—The surface that will give the best results depends on the size of the crowd who will see the pictures and the angle in which they can sit. If all the audience can sit close to the line of the projector, a beaded screen will give the most brilliant image although the highlights in color may be a little glaring. However, if some of the spectators have to be rather far from the line of the projection lens, they will not get as good an impression, and a flat white or "half-tone" screen will probably be better. If the group is to be large, it will usually be best to get the flat screen.

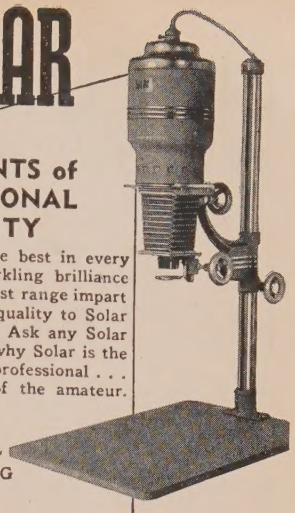
A Tribute

About ten years ago an article in Nature Magazine inspired the purchase of a Scottie dog, who was christened Sass. The life of a dog being what it is, Sass has now gone on to those Elysian fields where all good dogs must go. Because we were responsible for Sass, in a way, we are happy to print the tribute that his mistress, Ruth Thomas Johnson, Long Beach, California, sends us. She writes:

"Today I've lost one of the best friends I ever had. And if I didn't believe that in some happy Beyond he'd be waiting to welcome me, I'd find it hard to pick up my load—laid down to bid him farewell—and go on. 'Sass' was a gallant, adoring Scottie who never forgot that he was a gentleman, with a pride-inspiring pedigree to live up to. In our nine years of life together he never failed me—either to express joyful pleasure when we were together, or to express warning to anyone whose nearness might trouble me. When I spoke his name just before he finally left us, he couldn't raise his head to look at me but he bravely thumped his tail.

"When our Lord was here on earth he made no mention, I think, of the spiritual nature of animals. But, with sincere reverence, I'm sure that anyone as kind and understanding as our Savior would know that Heaven would be a lonely place for some of us without our own fine-souled dog. And I must keep my heart clean, my spirit brave and my lips kind, to deserve a place in the Heaven of our loyal, spunky, loving little Scottie."

SOLAR



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Recreation Congress

The twenty-sixth National Recreation Congress will be held in Baltimore, Maryland, from September 29 to October 3. National defense and the part that recreation plays in it will come in for active discussion at several sessions of the meeting. In the call for the congress it is declared:

"We defend the right of our children to play—unhampered by political, sectarian or racial theories. We defend the right of our boys and girls to grow and develop through sports, clubs, hobbies, camping, drama, music and creative arts and crafts into strong citizens of a living democracy. We defend the right of our young men and women to do together those things which mean comradeship, respect and understanding. We defend the right of all people—freed from the economic stress of daily work—to continue to find opportunities for life in recreation."

Shade Tree Conference

The Seventeenth National Shade Tree Conference will be held in Washington, D. C. from August 26 to 29, and a record attendance of more than four hundred delegates is expected. The meeting will bring together specialists and arborists, and the program will cover a wide range of subjects related to shade tree care and related civic activity. E. N. Cory of the University of Maryland is president.

Young Herpetologists

Some months ago we announced the formation of the Young Herpetologists and Naturalists of America by Miss Allyn L. Wood of 2502 North Alabama Street, Indianapolis, Indiana. At that time there were eighteen members in this group, which had organized to exchange information and experiences in this field. Miss Wood now advises us that the membership has jumped to forty-four, largely due to our note. Also the society has received gifts of collections of reptiles and amphibians, and of California sea life, from Morton Moran of San Diego. These are on display at Miss Wood's home, and members and prospective members that get to Indianapolis are urged to inspect them.

Fish Conservation

An interesting and valuable educational and conservation unit has been brought out by Myron E. Shoemaker, Pennsylvania conservationist. It has the group title of "My Fish Friends," and consists of two booklets. One of these is a 32-page, large-size booklet with seventeen colored pictures of fishes and twenty questions about the life and habits of these fishes. This is supplemented by a manual for teacher and student of 104 pages, presenting the answers to these questions and providing other pertinent data on fish conservation and culture. The first booklet sells for sixty cents with a paper cover and seventy-five cents with a cloth cover; the manual being priced at one dollar. Either or both may be ordered from Myron E. Shoemaker, Laceyville, Pennsylvania.

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Nature in Print

By HOWARD ZAHNISER

BURGEONING in summer, one has some difficulty in realizing that the world of Nature, which all about seems essentially so much of a pattern, so peaceful, so unchanging, is in reality just one aspect of a kaleidoscope, restless, and constantly changing, mysterious rather than apparent. It is almost startling, for example, to read Helen Gere Cruikshank's comment that "the ringing cries of a flock of Greater Yellow-legs coming out of the sky on an August night is a warning of the approach of autumn," and it does rouse one from his summer-time complacency enough to consider at least the existence of things far away, long ago, or in the depths of the mind. So roused, one should get in the midst of his peaceful summer living the maximum enjoyment from a trio of wildlife books now at hand, dealing with distant regions off the coast of Maine, centuries that have passed, and motivations of animal acts—the depths of mind.

Helen Gere Cruikshank, the author of one of these books, says of her husband, "I met Allan one evening after I had spent a day in a wild-apple tree, photographing Green Herons." Surely there could have been no better preparation for a meeting with this outstanding photographer and conservation worker and educator of the National Audubon Society. The companionship of these two observers of birds is one of the things to be enjoyed in *Bird Islands Down East,* and the book is evidence that the partnership is practical as well as romantic. Mr. Cruikshank's photographs not only represent his subjects faithfully but also interpret the scenes with a freshness that does not depend on any trickery but rather on the photographer's good eye and his skill. Mrs. Cruikshank's accounts of their summer experiences on the islands off the coast of Maine and their bird observations are interesting and informative, personalized and infectiously enthusiastic, yet also thoughtful, and with a serious note of conservation. Throughout her accounts of these strange birds to one from the mainland—the puffins, petrels, cormorants, guillemots, and others—one is conscious of the fact that the Cruikshanks' presence on these nesting areas is part of a great effort on the part of the Audubon Society to protect and perpetuate the colonies and to interest the general public in this cause. *Bird Islands Down East* is thus not only entertaining but also encouraging to all who are interested in conserving wildlife.

Willy Ley's "romantic zoology" under the symbolic but only partly descriptive title *The Lungfish and the Unicorn,* on the other hand, while replete with information and one of the most entertaining books that I have read in a long time, is far from encouraging to sentiments for preserving the living world that we know. Mr. Ley, a scholarly young German journalist who specialized in the history of zoology and paleontology, and in 1934 came to this country, where he handles the scientific material for the newspaper *PM,* is concerned in his most recent book with the past almost exclusively. The living creatures of our own times that are described are included because of their relation to the past that has all but gone, "living fossils," romantic but also evidence to Science of the nature of the past and the developments toward our present. Unicorns, giants, and sea serpents are among the first group of his subjects, labeled "Myth?", with the question mark. Curious fancies regarding these supposedly living creatures have never been more fascinatingly assembled and related to zoological reality. In another group described as "Witnesses of the Past," Mr. Ley includes the lungfish and other creatures that have survived through geological time, and he exploits to the full the curiosity about these animals, the adventures in their discovery, and the puzzlings of scientists with these forms of life that "just ain't," but are. The central group of Mr. Ley's essays is entitled "Extinct!" and includes accounts of the fates of auroch, wisent, bison, great auk, giant sloth, dodo, passenger pigeon, and other forms of life that are "as dead as the dodo." Even in this group of essays, Mr. Ley is thoroughly objective, ordering his facts with a rare sense of the dramatic, and writing fascinating reports instead of object lessons for conservationists or destroyers of wildlife. I regret that my copy of this book is missing pages 53 to 68, through some rare error, for this is a work that is exciting reading from beginning to end, and no one will willingly miss any page.

Animal Behaviour is a remarkable collection of facts and reports about the wild creatures, not presented as parts of complete descriptions of the animals to which they relate but marshaled rather as proofs for a theory; namely, that "organic acts caused by simple sensations are based on the principle of free, *intelligent* action." In other words, Dr. Loeser has thought deeply into the motivations of animal behavior and has chosen examples from the acts of wild creatures that make us all marvel, but he has seen nowhere anything real that can be described by our word "instinct." This is an old argument, in many respects, and certainly one that is not going to be settled on this page. It is unfortunate, that Dr. Loeser, a political refugee from Germany who died in 1939, less than a year after his arrival in Great Britain, was not able to put the finishing touches to his manuscript, for in many places it then might have seemed less like an argument about terms. In any case, it is both engaging and profitable to read the many instances of wild-animal behavior that are in this book and to pursue (Continued on page 406)

Books discussed in this article are:

Bird Islands Down East. By Helen Gere Cruikshank. New York: The Macmillan Company. 1941. 123 pp., with 49 photographs by Allan D. Cruikshank, and an index. 1941. $2.50.

The Lungfish and the Unicorn: An Excursion into Romantic Zoology. By Willy Ley. New York: Modern Age Books. 1941. 305 pp., with 32 drawings and an index. 1941. $2.75.

Animal Behaviour: Impulse—Intelligence—Instinct. By Dr. Johann A. Loeser. London: Macmillan and Co., Limited. 1940. 178 pp., with 41 drawings by Erna Pinner, and an index. 1940. $2.

PHOTOGRAPH BY WINTON WEYDEMEYER

THE RED-SHAFTED FLICKER, A COMMON BIRD OF THE DOUGLAS FIR, YELLOW PINE AND COTTONWOOD ASSOCIATIONS IN THE WEST.

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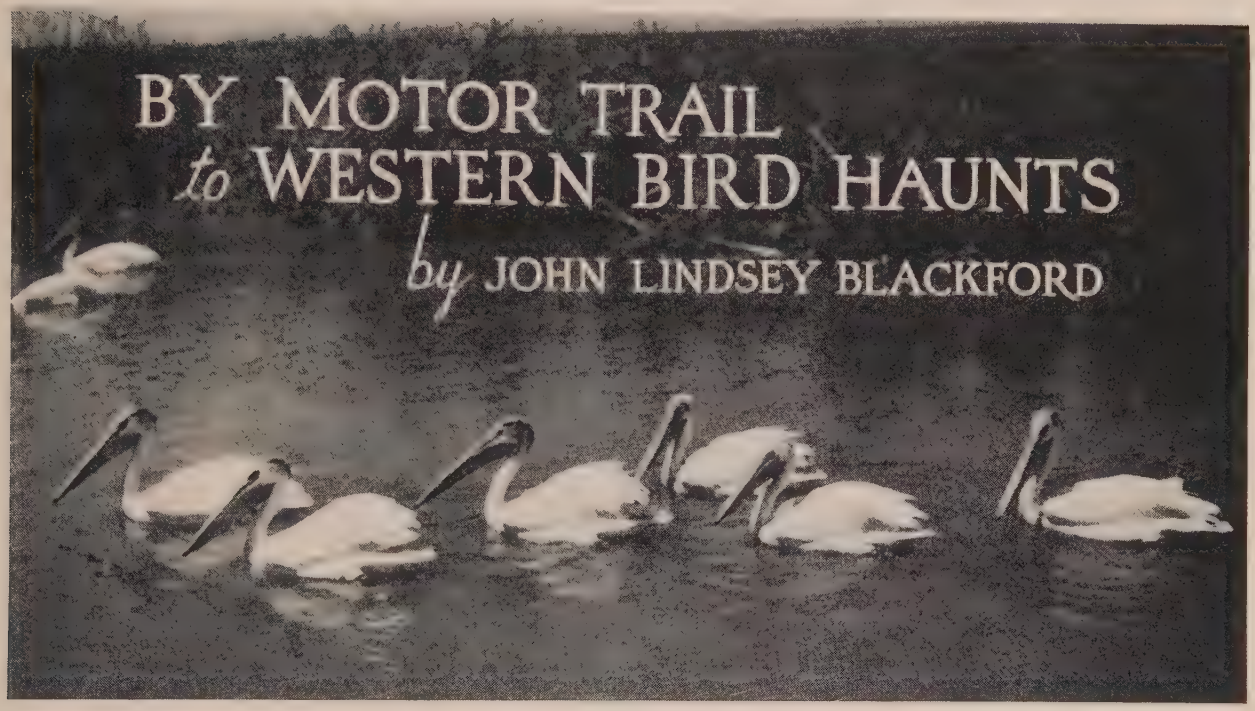


BY MOTOR TRAIL to WESTERN BIRD HAUNTS

by JOHN LINDSEY BLACKFORD

THE WHITE PELICANS OF THE BEAR RIVER MARSHES OF UTAH ARE BIRDS OF THE MARSH ASSOCIATION. THEY WERE PHOTOGRAPHED BY THE AUTHOR AS THEY SAILED SAFELY ABOUT ON THE WATERS OF A FEDERAL REFUGE

CLEAR, wild, indescribably melodious and free, a bird call broke the burning stillness of the sun-besieged mesquite thicket. A flash of vermilion in the low, thorny branches and I knew that for the first time I listened to an Arizona cardinal.

Yet the spirited, sweet whistle and the bright red flight of the departing songster were not unexpected. With the redbird's favored haunt—his preferred habitat—previously noted in my field book, this meeting had become a predictable matter. Just as I had successfully sought chestnut-backed chickadees in dim corridors of the coast redwoods, the lazuli bunting in tangles of wild rose, and, as any day in nesting time, you would look for a piping redwing in the cattails, so I had found the cardinal in his chosen domain. Under the feathery, green canopy of mesquite, crowding upon tall cottonwoods bordering the Santa Cruz River, near the old Tumacacori Mission in southern Arizona, he had been waiting, it seemed, for me. There I had expected to find him, and there certainly, in the mesquite, I should look for him again.

Once more a motor trip down through Western birdlands was proving the value of acquaintance with avian habitats. As I cruised south in May from Montana to the border, it had been possible quickly to observe leading members of one bird community after another. Seeking out a bird in this way—the cardinal in his thorny mesquite, the Gila woodpecker nesting in giant cactus, the goshawk in dark spruce forest—was much like calling upon a famous personality at his home address.

When professional bird men began prying into the lives of feathered folk they evolved several unique methods of study. Most fundamental and useful of these are the bird associations. They represent local distribution of species as determined by selection of homesites during the nesting season. In other words, they are the directories of bird life—a list of typical feathered residents for each distinct type of vegetation or other environment. Marshland, meadows, pine forest, beech-maple woodland, all have their individual communities of birds. Although many species are regularly seen in more than one habitat, and some owe no particular allegiance to any, it is nevertheless true that nearly all dominant types of cover can

MOUNTAIN STREAM HABITAT IS THE HOME OF THE WATER OUZEL, WHICH LIKES SUCH SPOTS AS GRANITE CREEK FALLS IN THE KINGS CANYON NATIONAL PARK

claim their own societies of birds. After familiarizing ourselves with the associations of an area investigated by naturalists, we know where to look for almost any of our winged friends.

The sage of eastern Oregon, where I stopped my impatient car on its way south, rolled a gray-green flood almost to the hot shoulder of the shimmering pavement. Alone, over the first low swell, one felt lost in an apparently shoreless sea of sage. On the vast, featureless flats beyond, this sea lay becalmed. In the uncertain distances, gray billows that were hills heaved up against the horizon. Few other retreats of the wild appear so unspoiled. Occasionally the drifting sand of the wind-swept floor rose in low, lazy dunes, heaped around stalwart shrubs. Antelope- and rabbit-brush mingled with the endless sage; and infrequently hostile mats of prickly pear dispelled the illusion of gentle, rising waves of shallow green.

Soon an exquisite tinkle of sage sparrow song pleasantly dispelled my first impression of pervading loneliness. It was repeated farther along the broad swale. Each small performer, balancing upon the tip of a tall bush, lifted his bill almost vertically to the blue and poured out his lilting lay to the gray-green wastes. A quarter of an hour later as I drifted through the scrub a large gray-brown bird raced off with startlingly long strides over the flinty gravel, long tail tilted up at an angle. The sage thrasher is a typical citizen of the sagebrush habitat, his rich voice one of its chief attractions. Where the sage mantle grew shoulder high, its gnarled, woody stems staggering like the trunks of a dwarfish wood, Brewer sparrows were common. As inevitable in the Great Basin as the aroma of artemisia itself, "sagebrush chippie" competently doubles for his namesake the chipping sparrow.

No roll call of sageland citizens would be complete without an answering sharp cackle from the sage grouse, the cock-of-the-plains. Once it "lived and died with the sage". Now there are vast gray empires from which it has wholly vanished. Gun-thinned ranks nowhere remotely suggest the "moving mass of gray" that reminded Grinnell of one-time flights of the passenger pigeon.

I did not find the sage hen here. But an aromatic twig, plucked from the scrub, magically recalled the gray blanket of sage and sprawling cottonwood border spread beside the dry banks of Powder River in Wyoming. There one day an unseen sage hen exploded from a dust bath at my feet. Another abruptly checked my next uncertain step, bursting into the air with all the seventy-mile-an-hour speed with which "prairie turkeys" are credited. Then a third and fourth whirled up. Only lengthy search for a telltale, glittering black eye located a fifth, crouching in sparse wheat grass. For ten minutes I circled slowly at only three paces away. Two more of the covey hurtled off in nerve-shattering flight. Still the crouching bird did not stir, so I left it "undiscovered".

Once the sage fowl's range matched the wide reaches of its habitat as few other birds have. The gun has taken what the coyote spared, but the habitat still remains.

Motoring south through the Malheur National Forest from Baker, Oregon, the thoughts of a birdman merge with the dreamy rhythm of yellow pine lands. Golden sunshine strikes down through lofty, needle-plumed crowns. Giant, rust-red columns pillar park-like groves. Resinous brown needles mat the cone-strewn ground floor, or thin, green pine grasses ripple before a vagrant breeze.

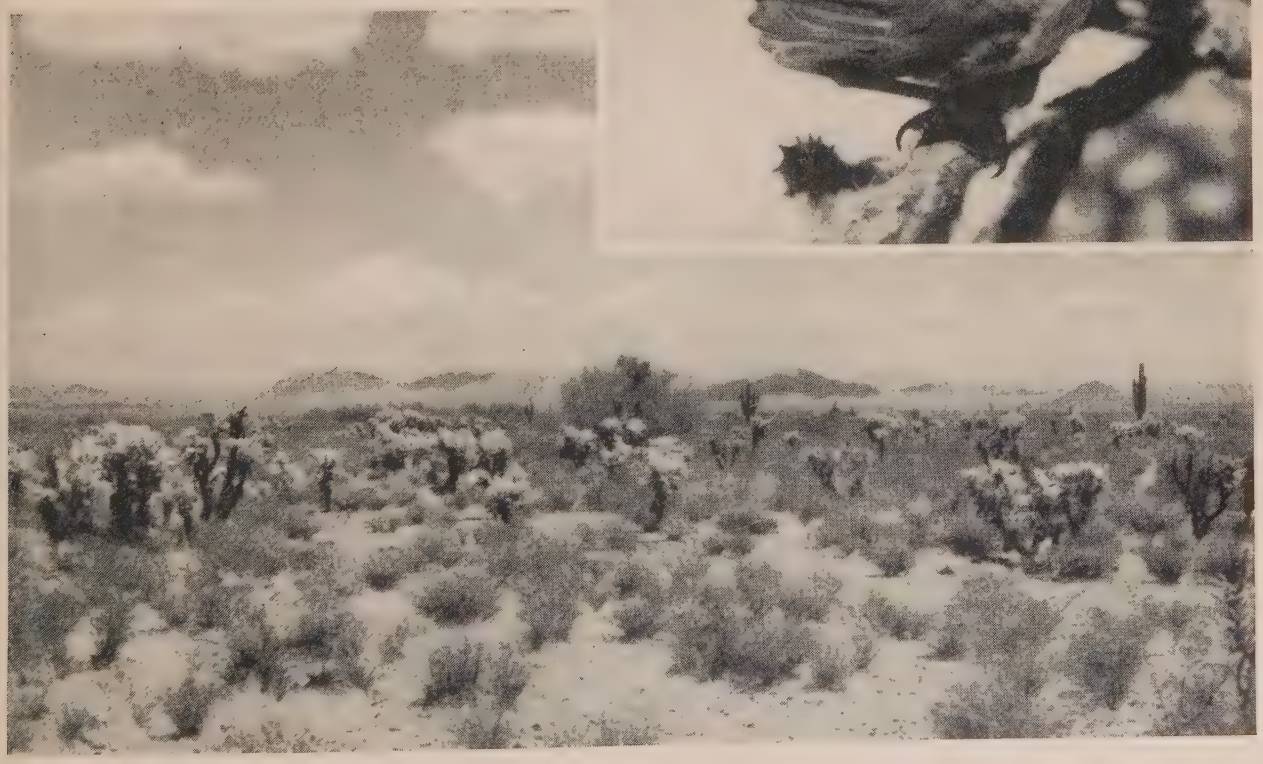
From high levels of the crooning conifers pours a melodic flood—the caroled ecstasies of the purple finch. All-blue mountain bluebirds flash between the cinnamon of mighty trunks, each a feathered turquoise. Swinging up on roseate pinions, a red-shafted flicker clutches the scaly bark of a pine bole, and strides upward into the moss-hung embrace of the evergreen. Distantly the gaunt, splintered spar of a dead giant resonantly echoes the tattoo of a hairy woodpecker.

More than a score of songsters, woodworkers and winged hunters are loyal to yellow pine. This bird association claims the brilliant western tanager, red crossbill, diminutive pygmy nuthatch and sparrow hawk. When lassitude threatens to overcome us along its sunny aisles, languid notes of weary wood pewees complete the spell.

Again the sage. On through central Oregon, up and over sheer ramparts of basaltic tablelands. Then, in a broad depression spilled from the Donner and Blitzen River, are the Malheur marshes. To restored lagoons, water channels and tule islands of once-drained, overgrazed lake bed, the marsh fraternity are enthusiastically flocking. Species, so modified in form and habit by life conditions of the marsh that they must vanish with it, have returned. Waders, reed dwellers, waterfowl, probers of the mud and ooze, all have come back. As I swept binoculars across reedland and shore, distinguished members of cattail-tule society could be identified in numbers. A western grebe glided, swan-necked, from the mirrored tule screen. Blue-billed ruddy ducks fanned stiffly quilled tails and jerked short necks spasmodically. The tremolo trumpet of a sandhill crane rolled from the wet meadows. With Clarence Sutter busily checking the honker birth rate, our approaching outboard launched a cloud of pelicans from a secluded rookery—the soggy crown of a submerged haystack, converted to nursery and landing field. "Crow ducks"—Farallon cormorants—were just hatching India-rubber-skinned babies amid the clutter of dead bulrush stalks and pelican eggs. Redwings, yellow-heads, blue herons, snow-white egrets and pelicans, all the colorful people of cattail, cane and tule are familiar to Malheur. A representative census of the marsh habitat might be compiled here at almost any season.

Birds of varied terrain are grouped within the rock association. Dwellers on alpine crest, prairie butte, rock slide and canyon wall find common interest in rocky haunt and precipitous nest site. King of rocky strongholds is the golden eagle. Frank Grove, assistant manager at Malheur, led up to the black rimrock that frowned above the gray sageland. Its clefts cradled an eagle's aerie. We

A YOUNG PALMER THRASHER, TYPICAL BIRD OF THE CHOLLA-CREOSOTE HABITAT, A CHARACTERISTIC SCENE IN WHICH IS THE REGION OF CENTRAL ARIZONA SHOWN BELOW



inched to the edge only to discover that the eggs we hoped to photograph were gone. Turning away, a fricative buzz like dry seeds shaken in a pod warned us significantly. Frank drew his "Woodsman" from hip holster and we tossed aside a slab of the vesicular rock. Coils of a dusty-brown serpent slithered from sight into a deeper crevice. Down below on the flat, at the foot of the jointed, columned wall of basalt, strange car tracks had come, backed, turned and hastened off across the sand—the bird nester! We concluded that a second rattlesnake had escaped.

Miles away where rimrock broke off with giant step to the plain below, Frank snubbed his rope around a weather-smoothed boulder and lowered me slowly over the jagged brow of the mesa. Two downy, hen-sized eagle chicks guarded the platform below, but with such babe-like docility that an affectionate hug apiece seemed to be demanded. A dazzling sun was hot on the rim of their sagebrush cradle, and they could be persuaded to sit there briefly for the spying camera only after a second visit. The golden hunters who sought supper for them evidently were so far afield as never to know our coming.

Next day, two hundred miles west, along Lake Abert's alkali-white shore, I watched graceful avocets troop its crusted strand, living murals of the beach world.

California's black oaks basked in the May sunshine as I sped down the slopes of the Siskiyous. Brawling Trinity River guided me through the Coast Range. On southward with the garden-green of Upper Sonoran foot-hills closing about me, I succumbed to the enchantment of the oak lands.

Mellow sunlight, spinning golden webs, glowed effulgently in the ancient groves. In tall grasses nodded blue larkspur and the bright gold of California poppies. Titmice and bush-tits, midgets of the valley oak-live oak association, scrambled through its shiny foliage. Jolly, black-red-white California woodpeckers yammered and shouted. Massive patriarchs beside Clear Lake extended burly arms over wavelets lisping in the reeds, and from their emerald leafage blazed the flame and jet of racketing Bullock orioles.

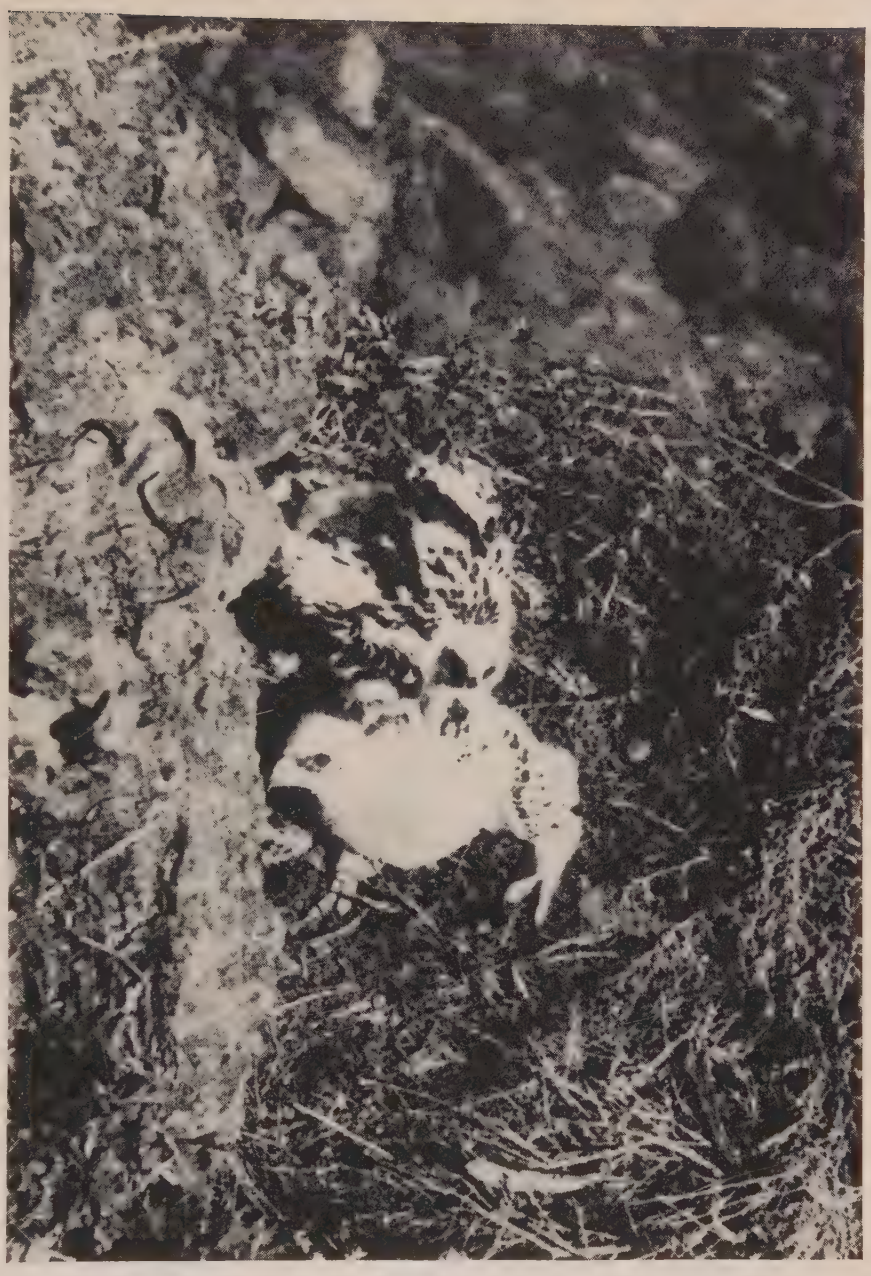
"Puck-o-the-Woods", lanky and long-tailed, was there; but not for nest robbing and such do I now remember the California jay. He flew down from a live oak, alighting on a driveway just before me. Its surface was spread with packed, finely-graded gravel, only a little coarser than rough sand. I could see that the jay carried a limp caterpillar in his bill. He struck the soft morsel lustily a time or two against the ground. Plainly, this was the coup-de-grace before the final swallow.

Puzzlingly, he did not dine at once, and proceed on his raucous way. Again and again he thumped the caterpillar against the ground, or so it seemed. But close scrutiny with the glasses revealed a difference. The jay was *drawing* his victim back and forth, from side to side, over the gravelly roadbed. At so short a distance the caterpillar was seen to be a hairy thing, almost woolly in appearance. The bird took a full minute or more at the task before bolting his catch; then squawkatively flapped into the farther oaks. That soft but bristly tidbit, although easy to kill, had required disarming. Is it not probable that the clever corvine found the fine gravel an effective grater whereon to remove a portion of the caterpillar's unpalatable spines? It would not be overrating his ingenuity.

San Francisco, the blue bay of Monterey, Carmel, Santa Barbara under her palms. Machine-choked highways behind, and Arizona beckoning out of the sunrise. Fantastic, dust-gray ranges wavered distantly through the furnace heat of desert valleys. A road runner streaked down a dry wash. Another vanished into a ravine that was grotesquely clumped with cane cactus, ocotillo and palo verde trees, and padded with prickly-pear. Beyond the winding Hassayampa, cholla-creosote mesas ranged their million spines against the intruder. But impish cactus wrens, harshly grating *chut chut,* showed the way. A black-throated desert sparrow jingled brightly and slipped through the thorn. Palmer thrashers, frantic at the appearance of a bird photographer, shrieked retreat. Even while a hapless fledgling was falling "victim" to my insatiable shutter, the over-shy parents kept to cover. Only once did mother thrasher summon courage for a sortie—close enough to disclose the reddish-yellow iris of her indignant eye.

Aridity and high light intensity, low, but effective cover, and a bare to sparsely-occupied ground floor are the prevailing conditions of the cactus-creosote habitat. Drab Leconte's thrashers

VALLEY AND LIVE OAKS IN MENDOCINO COUNTY, CALIFORNIA, ARE TYPICAL OF THE UPPER SONORAN ZONE



LOOKING DOWN FROM THE CLIFF ON A PAIR OF GOLDEN EAGLETS IN THEIR TYPICAL ROCKY HABITAT

and natty little plumbeous gnatcatchers are other residents who hold life memberships in this bird association.

Semaphore-like in the sunset, giant sahuaros raised vast arms into the flame over Picacho Peak, and neon-orbed Tucson crept nearer in the dusk.

Northbound at last beside the Santa Cruz, I paused for a siesta under the cottonwoods, while dainty Mexican ground doves pattered trustingly about me over the fallen leaves. By the brooding brown Colorado, vermilion flycatchers flickered in the mesquite fringe like scarlet torches of swaying candle plant. A last cactus wren on a desert rose, the brilliant lemon and black of a Scott oriole lurking amid stilleto blades of tree yucca, and I said a regretful good-bye to the alluring Southwest.

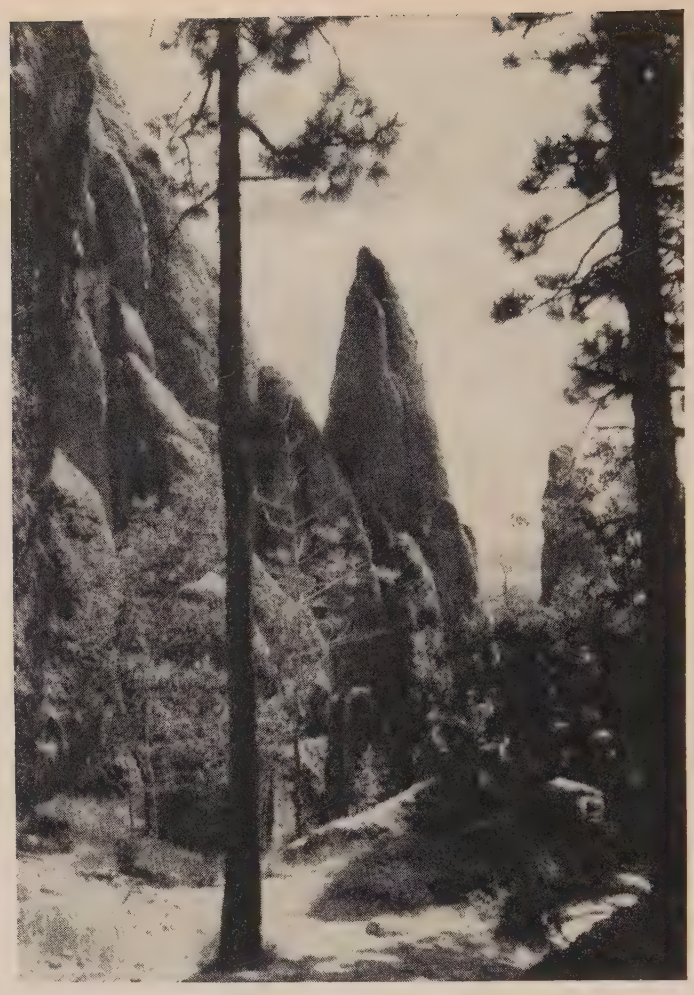
West over Tehachapi Pass, its sun-baked foothills, stippled blue-green by blue oaks and gray-green by digger pine, are the inevitable welcome to California's mountains. Upward, and again there was water; water dripping, gushing, plunging from off the glacier-gouged, gray-granite batholith that is the massive core of the High Sierras. Leaping in mist into Yosemite, surging crystal and white about the Happy Isles, foaming for fifty miles in King's Canyon. A thousand torrents, and water ouzel the king.

This spray-sprite, waterfall fairy, aqua-gnome, dry in his duck-down dress, splashes recklessly in alpine cascades from Alaska into Mexico, undisputed leader of the mountain stream habitat. The American merganser, breasting deep, swift, alder-lined creeks, and the harlequin duck, tumbling down roaring, boulder-studded channels, are scarcely rivals. The crested kingfisher tunnels his nests in creek banks. And where mountain streams course with the dignity of rivers, the spotted sandpiper, bird of river borders and mountain lakes, is certain to be present.

Above the oaks of the foothills, belting at mid-level the mountain wall, stands the Sierran montane forest. Within it sugar pines tower above fragrant incense cedars, yellow pines mingle with leafy black oaks, and white firs abide silently in moss-hung depths. Occasionally vaulted giant sequoia groves bulwark an already mighty timberland.

White and black patched wings of the white-headed woodpecker swoop down these Sierran aisles. Jovial, cosmopolitan flickers are listed here, as so often elsewhere. Steller jays, high-crested, dark-blue dandies, supplant dull-blue and brown valley cousins. In June in gargantuan temples of the Big Trees I heard pileated woodpeckers rolling out the mighty rhythm of their pillared solitudes. Colorful western tanagers gaudily daub crown and understory of the Sierran montane with brilliant chrome and crimson; and from a tall fir tip some unglimpsed olive-sided flycatcher will hurl out his wild *pi-pée.*

Click-it, click-it, click-it! A feathered, white-headed woodsman clatters up the furrowed trunk of the last giant sugar pine. Ahead, away north, Mt. Lassen sighs sulphurously under its snow blanket; Mt. Mazama lifts Crater Lake 6000 feet to mirror the bluest spot of heaven. Oregon's west-flung cliffs thrust rough-shod feet into the spray of Pacific combers, and other haunts await exploration.



AT THE NEEDLES, A PEAK OF THE RE-UPLIFTED BLACK HILLS HAS BEEN CUT INTO TALL, SHARP COLUMNS BY EROSION

THE HILLS ONCE WERE COVERED BY FORMATIONS OF ASH AND CLAY, NOW EXPOSED IN THE BADLANDS. THE TREES ARE PONDEROSA PINES

SOUTH DAKOTA'S BADLANDS

By CARROLL LANE FENTON

LES TERRES MAUVAISES—the evil, or bad, lands. Thus early French traders and trappers christened a strip of country lying southeast of the Black Hills, in what now is South Dakota. They doubtless applied many other terms in mixed Cree, Scotch-English and uncensored French when their horses wandered into this bewildering maze of cliffs, box canyons and ravines that seemed to vanish with the rising sun.

For the Badlands are a wilderness—a wilderness unlike any other on this continent. Yet the approach to them is far less desolate than the average western highway. It winds over rolling plains with wheat farms cultivated on the contour, and seemingly endless acres of range land where white-faced cattle graze. When we first crossed it that range was open; now it is cut off from the highway by mile upon mile of wire fence. "Too many tourists go through at night," said one rancher. "Can't have 'em bruising up our nice solid beeves."

West of Kadoka the road dips through washes whose underground water courses are marked by cottonwood trees. It also passes roadside photographers' stands, with stuffed bronchos on which tourists may pose for pictures to send their relatives back East. Then the road turns southward, dipping into washes that would be arroyos if they were found in New Mexico or Arizona.

The Southwest has bigger, deeper arroyos, but even the Painted Desert has nothing that compares with the scene that lies beyond. Walls of cream and pink clay engulf the road, rising abruptly from flats of still more delicate color. There are pinnacles and tiny, grass-capped mesas; there are ridges whose crests are so sharp that only a bighorn sheep would be able to walk along them. But the bighorn sheep are gone, although they were common in this region until after the Civil War.

The road winds past buttes and wide turnouts where visitors take photographs that often are sadly underexposed or taken too late in the day. Then the highway crosses Cedar Pass and really enters the Big Badlands. Done in words, they are just more of the same; in reality they are a maze of pinnacles, ridges, box canyons and valleys that quite defy description.

"What made them?" the visitor gasps. "What pushed those peaks and knifelike ridges up above the plains?"

The answer, strictly speaking, is—nothing. That is, the Badlands are not a region of uplift, like the Tetons or the Sierra Nevada. It is true that the region was pushed up-

ward, within the last two million years. But the movement merely made a high plain, with a rolling, grassy surface unbroken by buttes, pinnacles or canyons.

Erosion, not uplift, made the Badlands, just as it made the San Simon Wash and the great gullies of Stewart County, Georgia. It made them by wearing down soft land, digging deep valleys while it left small mesas, ridges and peaks.

Evidence of this lies all around us. Mesas lie at uniform levels. We can see that they once were wide, grassy tablelands from which sections have been worn away. Pink strata lie in butte after butte; we can draw imaginary lines that connect them across box canyons and ravines. Those ravines have the V-shaped cross section that characterizes valleys worn by running water. Gullies have the same sort of section, and their windings show how rain water raced down barren slopes. The valley of the White River is a flood plain, cut and flattened as the river winds its way to the Missouri.

SCAPHITE, A SMALL SEASHELL OF THE CHALK AGE
This specimen shows lustre well. Countless scaphite shells were buried in the black mud on the sea bottom

The river has made a wide valley; rain water cuts the Badlands and their precipitous ravines. You may doubt that on an August afternoon, when the barren slopes are cracked and hot under the blazing sun. You almost believe the garage worker at Scenic. "Rain? Sure there's rain—only I ain't seen none yet. I'm kind of a newcomer; been here only sixteen months!"

But camp, as we have camped, when clouds hung around peaks guarding Cedar Pass. You will be wakened by rain that drums on your tent or bangs against the trailer top. When there is light enough you look out. Streams of muddy water surround your camp, while falls that seem to be made of cream plunge down the sides of buttes. Undercut ledges collapse; pinkish white creeks boil and eddy as they flow toward ravines.

Other muddy water spreads out in sheets at the foot of steep slopes. While they flow, these sheets carry mud toward the river; when they stop flowing, they drop their mud in smooth, almost horizontal layers. These layers build up the bare platforms that surround separate ridges and buttes throughout the Big Badlands.

Three factors make rain water effective. First, most Badlands rains are sudden and hard, often having the force of cloudbursts. Their water has no chance to sink into the ground, but runs off and takes part of the ground with it. In this it is helped by the fine, soft clay which erodes more easily than stone. The process also is aided by scanty vegetation, with neither roots to hold the clay nor leaves to stop the force of rain.

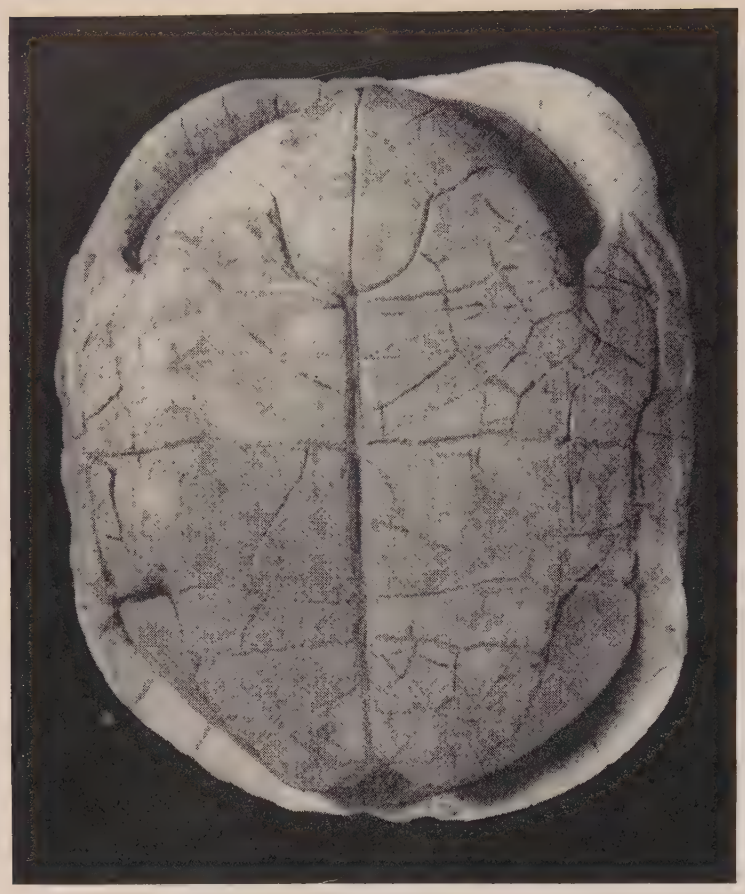
Such are the Badlands of today: a high plain partly cut to pieces by the action of rain. Now for the story that lies behind them. What built the plain in the first place? Whence came the pastel-tinted clays? What animals became the fossils whose bones, teeth and skulls sometimes are washed from the crumbling cliffs?

Our story begins with the Cretaceous, or Chalk Age, some 90,000,000 years ago. In those remote times, the region that now is the Rocky Mountains consisted of lowlands and swamps through which dinosaurs roamed. East of the swamps lay a shallow sea. It surrounded granite uplands that now are the Black Hills and stretched from the Arctic Ocean to the Gulf of Mexico.

Oysters, snails and other mollusks lived on the bottom of that sea. Most beautiful were creatures called scaphites—coiled, rough-shelled relatives of the modern nautilus. Countless scaphite shells were buried in black mud that settled on the sea bottom. With them were baculites—mollusks whose shells began with coils but then became flattened tubes. These tubes were divided by crumpled partitions that make graceful, fernlike patterns on the petrified shells.

As the Chalk Age drew to an end, the sea muds hardened into shale and pushed upward into land. We cross them today as rolling plains that lie west of the Missouri River. Their weathered shale forms the soil of pastures and of wheat fields.

We now skip two geologic epochs whose tale is not told in the Badlands. During them the Rocky Mountains were pushed up and worn down; so were minor ranges such as the Black Hills. Dinosaurs disappeared; in their place came the creatures we call mammals, which have hair, warm blood, and glands that make milk as a food for their young.



SHELL OF A LAND TURTLE

This is one of the fossils now commonly to be found in the Badlands of South Dakota. Below, a fossil fish. These are rare in the clay strata in the Badlands. This small one was found in a lake deposit in North Dakota. In age it corresponds to the beds of cliffs above Cedar Pass in the Badland region of South Dakota

Flowers and trees also developed, the latter making forests much like those growing on earth today.

This brings us to the Oligocene Epoch, which began about 50,000,000 B.C. and lasted some 10,000,000 years. Throughout much of this epoch, a wide, flat plain stretched from central Colorado to Montana and North Dakota. In dry seasons this plain was bare and dusty, with rivers and a few small pools in which animals drank. In wet weather the rivers overflowed, turning the whole region into a temporary lake.

Rivers also brought fine-grained mud from the distant Rocky Mountains. Sometimes the mud was pale lemon-yellow; at other times it was old gold or pink. As centuries passed, cream and pink became the commonest colors. These changes gave various hues to the beds that now make up the Badlands.

While rivers were bringing and spreading mud, winds carried volcanic ash and scattered it over the lowlands. Some of this ash doubtless came from small volcanoes northwest of the Black Hills. Ash also came from larger volcanoes of the Rockies, several hundred miles away. At some times so much ash dropped on the ground that it formed dazzling, pure white beds.

Suppose we picture those lowlands of 35,000,000 B.C. They were prairies as flat as the Texas Panhandle, but covered with green grass. Here and there were shallow ponds, and

streams containing schools of small fish. Groves grew on low hummocks. Their trees were poplars, walnuts and oaks whose leaves resembled those of species now growing in California.

On this grassy plain lived a vast variety of animals. Land turtles crawled through the grass, feeding on tender herbs and drawing into their shells when danger threatened. Herds of small camels roamed the open country; so did long-tailed, plant-eating beasts known as oreodonts. Bands of three-toed horses scampered about, looking more like gazelles than like the horses of modern times. They often fled from small saber-tooth cats, or from hyena-like carnivores with big heads and clumsy legs. These creatures really were survivors of an earlier age, when mammals had just taken over the lands abandoned by dinosaurs.

Far more dangerous were beasts known as giant pigs. They were big, rangy animals whose huge heads were made hideous by knobs and flanges of bone. Their principal food was roots, which they dug with thick, sharp tusks. Like the modern razorbacks, however, they ate almost anything they could get and were ready to start a quarrel on the slightest provocation.

Largest denizens of these ancient plains were the titanotheres. At least forty kinds of

PETRIFIED BACULITE SHELLS FOUND NEAR THE BADLANDS

These specimens were taken from the sea beds of the region. Below, pinnacles carved by torrential rain waters near Cedar Pass. The photograph made at 6:30 a.m.

these animals lived, died and left their remains in the ashes and clay that now form the Big Badlands. They were massive, barrel-bodied beasts with the general shape of a rhino. They had wide, concave heads with two blunt horns and tiny, piglike eyes. The largest species was eight feet high at the shoulder and almost fifteen feet long. The bulls weighed four or five tons—more than most elephants now seen in circuses and zoos.

When these varied animals died their bones lay on the prairie. Some were crushed by hyena-like beasts; others were gnawed to bits by rodents. A surprising number, however, were buried by deposits of clay and slowly petrified. Today they bring fossil hunters to every corner of the Badlands, in search of skeletons for the great museums.

The titanotheres died out long before the last beds of clay settled upon the prairie. Then came epochs of uplift, shifting and deposition, forming beds of rock that now are found in nearby regions, but not in the Badlands. The last uplift came during the Ice Age, when the Black Hills became mountains again. Frost checked and split their granite peaks, dividing them into pinnacles, while streams cut valleys into their slopes. Yet among them, one still may find remnants of pink and cream-colored clay, whose even layers tell of the time when prairies spread throughout the region and flooding streams spread mud where now are canyons and peaks of Nature's architectural mastery.

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A Jungle Harlequinade

By VICTOR W. VON HAGEN

IN THE jungles, where mimicry and masquerade are the best of Nature's protection, nothing should be surprising, yet you would gasp in astonishment at the harlequin beetle. Its make-up for its jungle masquerade is outlandish. Its elytra, or wing covers, are bizarrely marked with red, black and gray. Its multi-faceted eyes make a complete circle about its small head. Still more astonishing are the two elongated front legs—a long three inches in length. As it climbs a rubber tree in order to deposit its eggs in the bark, the long legs move on ahead like the tentacles of an octopus. The moment there is rustling in the trees, the insect stops. The legs seem then like twigs, the harlequin's body resembles the tree-bark. Mimicry? Protection? Yes, precisely that is what the colors are for. As to the elongated front legs, their reason is anyone's guess.

THE HARLEQUIN BEETLE

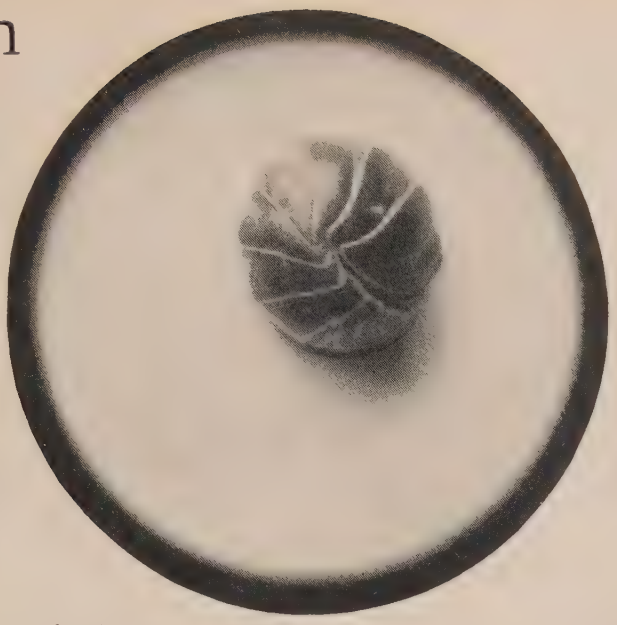
Note the long front legs from which it gets its scientific name of *Acrocinus longimanus*. The fingers in the picture at the left give an idea of the relative size of the strange jungle beetle. Its over-all length is about seven inches and the antennae are notably long. Protected by its coloration, this beetle is an outstanding example of Nature's provisions of this kind

It still has another protection—its siren. If a bird wishes to take a chance and seize this seven-inch-long beetle, the harlequin gives out a rasping sound like a rough-toothed file being drawn against wood. Held in one's hand by the two points on its meso-thorax it continues to bow its head like an old gentleman with palsy, all the while giving out this rasping noise. On the middle of the meso-thorax is a strip of highly-polished chitin; under a lens this proves to be cross-wise ridges of teeth. The back of insect rubs on this series of teeth and out comes the noise of rattle and filing. Is it not proper, indeed, that a harlequin beetle carry a rattle to its jungle masquerade? Without question it is dressed for the part.

Crustacean in Armor

By ROBERT A. NICHOLS, III

With illustrations by the Author



THIS IS HOW THE PILL BUG LOOKS WHEN YOU DISTURB IT IN ITS PROTECTED HIDING PLACE IN THE GARDEN

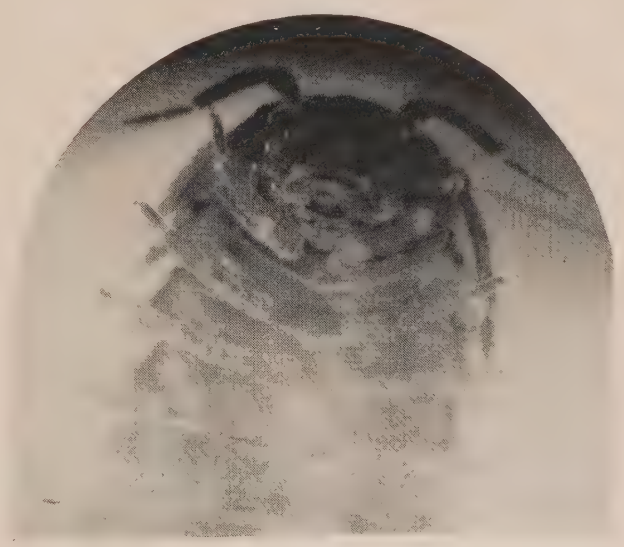
THE PILL BUG IS NOT A BUG OR AN INSECT, BUT A SMALL AND VERY INTERESTING TERRESTRIAL CRUSTACEAN

THERE are few who are not familiar with the little gray bugs that inhabit our gardens in damp warm sites beneath boards, trash, or in other protected places. Although these small creatures are commonly termed pill bugs, wood lice, armadillo bugs, rolling bugs and the like, they are not true bugs, or insects even, but rather small terrestrial crustaceans.

On first thought it seems strange to consider pill bugs in the same class as crayfish, crabs or water-fleas. In fact, one may justly ask, "What makes a pill bug a crustacean and not an insect?" This could be easily and briefly answered by saying that insects are six-legged animals with two antennae and three body parts—head, thorax and abdomen; crustaceans are ten-legged animals with four antennae and two body parts—cephalothorax and abdomen. Before we dash to count pill bug appendages, it would be wise to add that, even though this crustacean has twelve legs and only two antennae, the first pair of legs are modified antennae used in locomotion.

Pill bug, *Armadilium,* receives both its common name and its scientific name from its curious habit of rolling itself up into a ball when it is disturbed. The scientific name is by far the more descriptive, because, besides the rolling habit, it also has protective plates on each segment and is comparable to the well-known little mammal, the armadillo. This animal (the best known species is found from Texas south to Panama) has a skin containing bony plates that form a hard shield on the dorsal side of the animal. When disturbed, it rolls itself into a ball and thus escapes injury. Of course, this mammal is a wonderful creature, but many people marvel at its method of protection and ignore the pill bugs in their own back yards; these little knights in armor are doing the self same thing in a world of their own.

In our search about the pill bugs' habitat we often encounter members of the family that do not resort to the famed protective position. These "non-rollers" are sow bugs; and although they are often confused with pill bugs, they are a different species. Sow bugs, *Oniscus,* are larger than pill bugs, averaging three-quarters of an inch in length; whereas pill bugs rarely exceed the one-half-inch margin. Besides being longer, sow bugs are two and three times as wide, and are flatter and lighter in color. One of the chief differences is found in the two tail-like projections that are prominent on the last abdominal segment of the sow bugs, and absent on the pill bugs. Sow bugs make up for their non-use of the curling position by their speed of locomotion, and they make veritable "slow pokes" of their rolling cousins.



THE HEAD END OF THE PILL BUG AS VIEWED FROM BELOW. ITS FIRST PAIR OF LEGS ARE REALLY MODIFIED ANTENNAE THAT ARE USED FOR THE PURPOSES OF LOCOMOTION

It is interesting to note that although true land creatures, these animals must have moisture; consequently the very air they breathe must be saturated with it. They breathe this moist air by the aid of a series of respiratory bronchial plates, or blood gills, on the under surface of the abdominal segments. These gills appear as waxy-white plates on the segments. If one of these land, air-breathing crustaceans is placed in a dry environment, death is only a matter of an hour or two, as with the fishes.

DORSAL AND VENTRAL VIEWS OF THE PILL BUG, SHOWING THE CONSTRUCTION OF THIS LITTLE VERSION OF THE ARMADILLO. EIGHT LARGE PLATES COVER THE HEAD AND THORACIC SEGMENTS, AND SMALLER ONES PROTECT THE ABDOMINAL SEGMENTS

In order to observe more closely the habits of these land relatives of the crabs and crayfish, I collected a few representatives for study. Choosing mid-winter for my pursuit complicated matters, but after a careful search in the frosted earth and among the leaves under a garden trash basket I removed a dozen gray pills from their place of hibernation. Tightly curled into their defensive attitude, they were placed into a prepared observation den—a glass finger bowl with sloping sides and partly filled with moist earth and bits of bark and flat stones. The bowl containing the hibernating animals was placed in a warm, sunny window. The pills soon began to stir and gradually widen the opening through which a number of slowly moving appendages made their appearance. After they had turned over on their stiffened limbs, and had removed the hump from their backs, they moved to seek shelter from the bright rays of the sun beneath the stones and bits of bark. With these little creatures, appreciation for the sun is a fifty-fifty proposition—heat waves, but not light rays, are their preference.

This miniature Utopia was kept on a window sill, and the desirable moisture was retained by fitting a piece of glass loosely over the top. During the day the bowl was an empty world, as the pill bugs spent their time beneath the retreats of stones or bark. With the approach of darkness, they came from beneath their hermitages for their customary nocturnal tours in search of food. What had been a "deserted village" during the day became a moving mass of hungry armor-plated crustaceans. The rays of a study lamp, however, sent them scurrying beneath their day houses or to hide their heads beneath a piece of debris.

Both sow bugs and pill bugs are vegetarians. In the wild they turn rubbish and decay into the means of life; but in our well-tended gardens and greenhouses they become a pest hard to eradicate. They injure greenhouse plants by feeding on the roots; garden plants by feeding on tender sprouts. My little captives showed a fondness for carrots, beets and other root vegetables, cutting indentations deep into bits of these foods. Markings of chewing on the chips of bark was evidence that decaying wood and moss were also included on the menu. Having observed with anguish the results of their feeding habits on tender garden seedlings, I planted several bean and pea seeds in the earth of the finger bowl; and before the seedlings could claim a day's existence above the ground, the entire plant was cut down as neatly as a woodman cuts down a tree. Thus our interesting little friend becomes an enemy of the first class when he leaves the wilds for the cultivated lands of men.

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The Painted Desert

By L. L. THOMPSON

Colors, dull to bright,
  Sifted o'er the landscape
Like dust
  From brooms used in sweeping
The rainbow.

Patterns in grotesque shapes,
  And intricate designs
Sketched in form and shadows.
  Ever changing,
Seen—then lost.

A veil of wonderment
  Surrounds me;
Earth's canvas, sculptured, painted.
  Again,
The Master's hand.

THE MUSHROOM APPEARS IN A GLASS MOSAIC AT THE METROPOLITAN MUSEUM IN NEW YORK. THIS DATES FROM THE IMPERIAL PERIOD, 31 B.C. TO THE FOURTH CENTURY A.D.

Fairy Rings of Memory

By AGNES DE LANO

With the recurring tide of summer, outdoor folk take down their reels and creels and set forth for the neighboring streams, baskets all packed for a picnic in "some melodious plot of beechen green and shadows numberless". Some will fish and some will cull wild flowers, but few will even know how to share the pleasures of the mushroom-seeker. He, however, may be glad in his secret heart, for the most attractive mushrooms hide away in the most secluded places, and the real mushroom lover shudders a little at the thought of any profanation of these wooded sancta sanctorum.

How fondly I recall certain places reached by paths known only to myself, places that are but part and parcel of a prosaic countryside to the incurious passer-by, but places endeared to me by my bestowal upon them of such names as "Stropharia Pasture", "Amanita Wood", and "Marasmius Meadow". Their very sounds conjure up memories of fairy-rings in the dewy grass, of tiny parasols in damp leaf-mould, and of troops of amanitas beautiful to look upon but often treacherous in their loveliness. I think of a wood-fringed cove in Maine into which I steered a row-boat one listless summer afternoon, and behold, a mushroom Paradise meets my remembering gaze. Paths, pine-needle-carpeted, lead into the deeper wood. All around lie logs in mossgrown decrepitude. And *everywhere* are mushrooms. Russet and purple cortinarias make up the sturdier array; russulas, vivid in their rosy colorings; lactarias, velvety like some luxurious fabric; and orange cupped chanterelles dot the green. Thick clusters of shaggy-manes nestle in the dark hollow of a tree-trunk, and the peaked heads of golden hygrophorus jewel the cushioned plumpness of a mossy knoll beside the spring. Papery little fairy rings like the daintiest of diminutive Japanese parasols bring whiffs of garlic to my nostrils, for these little plants are strong enough, even a few of them, to make savory the most insipid, tasteless salad.

Few things are more delightful to the eye than a fairy-ring. Small wonder it is that folk lore abounds in legends of their magic power. In Holland fairy-rings mark the spot where the Devil churns his butter. In rural France, children are warned against entering a fairy-ring, and when caution needs the emphasis of a threat, they are told of enormous toads with bulging eyes whose hopping ground is within the circle's mushroomy rim. In Sweden the boundary marks the spot of hidden treasure, but treasure that can only be unearthed with the friendly aid of fairies. In Wales these rings are tracks traced in the dew by dancing fairies, and in England, good luck attends the shepherdess and her swain who build their cot on fairy-ringed ground. Perhaps Shakespeare's Audrey and Silvius lived in a thatched abode circled with dark grass footprinted by elves and fairies. Some folk look upon lightning as the cause of fairy-rings, and a no less august person than Erasmus Darwin, grandfather of the illustrious Charles, wrote in 1791,

"So from dark clouds the playful lightning springs,
Rives the firm oak and prints the fairy-rings".

Down in Kent, along the very road covered by Chaucer's Canterbury pilgrims, they will tell you that mushrooms are "pixie rings broken into fragments as the first bright bannerets of day are flung across the eastern sky". In homelier phrase, the Welsh farmer simply names them "dew-posies".

The folk have bestowed upon mushrooms many pretty names—names far more meaningful than the learned appelations that scientists and pedants so knowingly apply. Who would not rather find a Pasture Parasol than to lug home a *Lepiota procera?* And how much friendlier is a blewitt than a *Tricholoma personatum!* In the Middle Ages when people knew both their saints and their woodland plants, they called this same mushroom Saint George's mushroom. And Saint Gudula, too, had a mush-

room named for her. She used to go about with a lantern in her hand, throwing its pious beams into a naughty world, and whenever it flickered and went out, an attendant angel was at hand to relight it. No wonder that, when a glorious yellow mushroom appeared in January, they named it Saint Gudula's mushroom. A *Lactarius* was prettily called Saint Denis's mushroom. Ink-caps were appropriately named by those who never had heard of *Coprinus,* but who knew that the thick black liquid from the cap's deliquescing under-surface made the ink used by the cloistered monks who labored patiently in their quiet scriptoria over many a sacred manuscript. The whitest little mushroom in the wood was called the "Virgin", while "Witches Butter", "Elfin Cups", and "Fairy Saddles" were all familiar to those who lived "up the airy mountain and down the rushy glen", and who were used to the presence of "the little people".

The name mushroom itself is of doubtful origin. But "puff-ball" is known to be a corruption of "Puck-ball", and so Robin Goodfellow and his merry crew have a hand in naming these quixotic growths. Neither do we know when the term toadstool came into use, though Spenser, the poet's poet, used the term "Paddick stool", and in northern dialect "Paddick" was a synonym for toad. Some say that toadstools have nothing to do with toads, but refer to an old Saxon word, "tod" which means "clump". This word occurs in Coleridge's *Rime of the Ancient Mariner,* when the poet speaks of "the ivy tod" that was "heavy with snow". Be that as it may, the words toadstool and mushroom are constantly misused by people who erroneously believe that one is edible and the other poisonous. Neither word in reality denotes any friendly or venomous intent on the part of the plant. There are plenty of edible toadstools and as many poisonous mushrooms.

I have long wondered at the indifference of poets to the charm of mushrooms. Why should violets by mossy stones, and wee, modest, crimson-tipped flowers have caught their fancy while mushrooms have been left to blush unrhymed? Only once in a great while does one come across a gracious allusion to them. Southwell, in his *Poems,* printed in 1595, has a couplet that runs,

"He that high growth on cedars did bestow
Gave also lowly mushrumps leave to grow",

and one of Shakespeare's contemporaries penned these quaint lines,

"That cedar
Under whose girdle, nay, beneath whose knee
The little mesrumes lovingly agree".

The pleasant variations in spelling suggest savory messes of "mesrumes" and "mushrumps" dressed by a "neat-handed Phyllis" and preferably to be topped off with a marchpane or a junket. Emily Dickenson let a mushroom grow in the tangled garden of her verse, but alas, it was a wicked one that she calls "Nature's Iscariot". That whimsical and open-eyed Irishman, Oliver St. John Gogarty, has had the grace to include a mushroom in one of his volumes of poetry, which is no more than one might expect from a man who has presented a brace of swans to the river Iffey. Because other poets have failed me so lamentably I have dedicated a few lines to mushrooms myself. One such effort I called "Invitation". It runs as follows:

When April skies let fall their first soft showers,
Before the woodland ways are spread with flowers,
From the warm earth or from a mossy bed
The early mushroom lifts its pixy head
And nods invitingly, as if 'twould speak
And say, "Let's start our game of Hide-and-Seek".

Once the eye is trained to spy out mushrooms, it finds them in the most extraordinary places. Mine, for instance, rejoiced to find one once in the Metropolitan Museum in New York. To be sure it was a mosaic one, near which there squatted a mosaic rabbit—both relics from a Pompeian house that was lava-covered some two thousand years ago. But it lifted my spirits to know that in those remote and far-off times, some one had loved mushrooms well enough to immortalize them in bits of stone and glass on which a modern mycologist might feast her eyes. I was once window-shopping in Florence, when amid a jumble of antiques and *objets d'art,* my eye fell upon an *Amanita muscaria,* perfectly modelled and beautifully enamelled. It grew in one corner of a tiny silver pedestal, and, beneath it, two pixies were blowing poison into the poison cup with a pair of diminutive bellows. Their little peaked caps were studded with rubies, their tiny tunics with emeralds, and their elfin shoes with diamond chips. A Medicean treasure, wrought, perhaps, by Cellini himself. Who knows?

My most curious mushroom adventure befell me in the night. I was visited by a mushroom dream. I found myself turning the pages of a ponderous book. Each page bore the portrait of a mushroom, drawn and colored with an almost miraculous verisimilitude. But that was not all. Each picture was captioned by a quotation from *Hamlet,* which, strangely enough, fitted aptly. One plant had a stem "as I have seen it in the life—a sable, silvered". The line belonged definitely to the mushroom and had not a thing to do with the beard of an old Danish king. Another had its habitat, "there where the willow grows aslant the brook", while a third was said to thrive "on the dew of yon high eastern hill". A pretty and shy little plant was described as growing "along the primrose path", while an inky mushroom that looked threateningly from its page was described as "black as Vulcan's stithy", and also carried a warning of its poisonous nature in the line, "Contagious blastments are most imminent". On the very last page of this dream book was pictured the *Amanita,* the treacherous "Destroying Angel" and beneath it was this touch of Shakespearean wisdom:

"The canker galls the infants of the spring
Too oft before their buttons be disclosed".

Like all dreams, this was real and convincing. I awoke, bewildered by the curious workings of the subconscious mind. Never, in my waking hours, would it have occurred to me to fit Shakespearean phrases to mushroom characters, but the trick was turned, and so neatly, that I have been wondering ever since whether it is my destiny to go on teaching English in a young ladies' seminary or to abandon myself to hunting mushrooms along life's wooded ways.

Reading from left to right, the ideographs in the upper row are the old form of writing sun, moon, hills or mountains, horse, fish and tree. Also reading from left to right, the figures in the lower line express the same thing in the new or modern form of written Chinese

Nature Through Chinese Eyes

By FRANK A. WOODFIELD

Chinese ideographs by James Wu

Do you know what a "dragon shrimp" is? Or a "flower stripe horse"? Or a "melody of many birds peach tree"?

You do if you know the Chinese language.

The Nature lover who is so fortunate—or so foolhardy!—as to become fascinated by the intricate picturesqueness of Chinese will find, in its written form, unlimited surprises.

Generally speaking, written Chinese comprises symbols that are quite complicated, but sometimes in its relation to natural objects it is startlingly simple.

Fundamentally, written Chinese is a picture language. In some of the simpler forms it is frequently easy to see—or understand—the relationship between the symbol in modern use, and the picture as it may have been drawn by some individual trying to express a thought in writing many centuries ago.

Of its close association with Nature, its "earthiness", there seems to be no doubt. Nearly one-third of its 214 radicals (the elementary symbols on which the 40,000 or so words of the written language are based) are signs for the more common objects in Nature.

As we in English combine various elementary words and parts of speech, so do the Chinese combine these basic written forms in numerous ways to create ideographs that take on new individual entities in which the original meaning of the component parts often is lost.

EVENING

DAWN

MALE

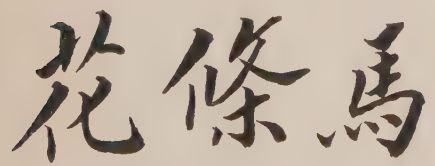
FEMALE

CHILD

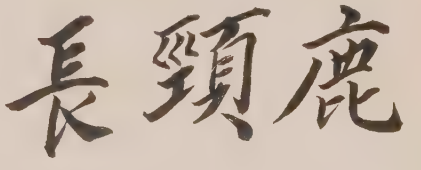
SMALL

In many of the common combinations dealing with animal and plant life qualifying terms are used with the symbol representing a generic group—such as bovine or equine—to indicate classifications of sex and age, instead of employing entirely different words as in English. For example, to obtain "cow" (of the bovine genus)—"bull" and "calf" in Chinese—one combines the respective words for female, male, and child, or small, with the symbol indicating the bovine genus. Or, for "heifer", one combines words meaning both "small" and "female" with the bovine ideograph.

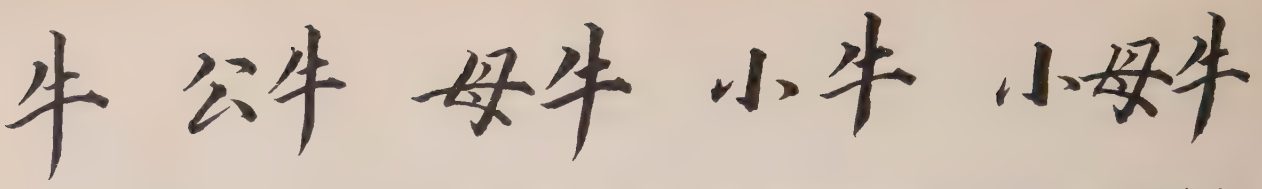
In some instances where two distinct types of animal are involved, but where the easily apparent difference may be one only of size, for example, the distinction between them frequently is represented in such a manner. This would appear to indicate that the precision of speech demanded for scientific description may present unusual difficulties in Chinese, despite the fact that the written



The way in which the Chinese writes the word for zebra, a combination of symbols that mean flower, stripe and horse respectively



When the Chinese want to write the word for giraffe they put together the ideographs that mean long, neck and deer—an effective description



The five ideographs above are important in the cattle market. From left to right, they signify cattle of the bovine genus; male bovine, or bull; female bovine, or cow; small bovine, or calf of a cow; small female bovine, or heifer. On the preceding page the figures for male, female and small are shown and we see how, combined with the symbol for cattle, the written Chinese language employs them

language is estimated to be used by approximately one-third of the world's inhabitants.

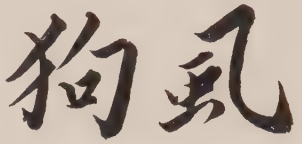
In cases of symbols for animals or plants, whether or not they are objects familiar in Chinese territory, one frequently encounters the odd, the picturesque and the beautiful.

Here are some literal translations: Caterpillar—vegetable insect; giraffe—long neck deer; orang-outang—Buddha monkey; zebra—flower-stripe horse; cuttle fish -ink fish; flea—dog louse; spider—hard working, industrious; lobster—dragon shrimp. By using the word for insect in front of the word for horse the combination becomes a wasp. The word for insect in front of the word for bird, when taken together, denotes a hummingbird. The combined symbols for "cherry tree" actually are a combination meaning "melody of many birds peach tree".

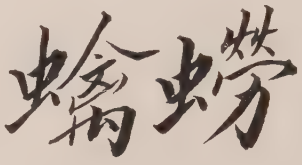
Chinese words for meats are frequently analogous to those found in a number of Occidental tongues—that is, they combine the word for flesh with the name of the animal.

Various terms for kinds of weather, points of the compass, the heavenly bodies, and such, frequently show the closeness of the language to Nature. The word for east is the sun shining behind a tree. A star is the word for sun above the word for alive. Several terms associated with winter are based on the two-stroke sign for icicle.

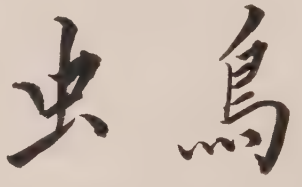
Evening is connoted by using the symbol for moon, slightly changed to give the appearance of movement—that is, a "rising moon". Dawn is indicated by the sun above the horizon line. A single ideograph for tree means tree or wood (as in carpentry); two indicate woods or forest; and three symbols combined denote a dense forest.



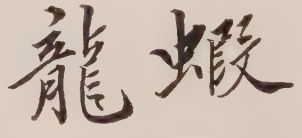
The figures for dog and louse are combined to form the word for flea



Spider combines the words to hustle and to work hard



Hummingbird is made up from the figures for insect and bird



Lobster is a combination of words for dragon and shrimp

In some cases the quality, real or imagined, of natural objects is used to give expression to more abstract thoughts. For example, signs for grass and insects, so plentiful in Nature, are embodied in the sign for "myriad", while symbols combining to mean small, crafty, black dog become synonymous with villain.

The symbol for bright is a combination of the signs for sun and moon, side by side. It is also interesting to note that the ideograph for sun also connotes day, while that for moon is identical with month.

Parts of the body, both for human beings and animals, are often interesting both as individual symbols and in combinations to make other words. One of the words for hair (which also connotes streaky) is formed by three slightly curved, parallel lines that look as though they were hair on a caricature by a comic artist. Hand is easily seen as a conventionalized picture of that member, while the word for thumb is a combination that literally means "hand mother".

The word for foot, combined with another sign becomes the heel of a horse, while in yet another combination it means to kick. Still another word picture—claws—when combined with another symbol, indicates to climb or crawl. Mouth is a simple square.

Cherry tree is a lovely ideograph formed by putting together the symbols that mean a melody of many birds, peach and tree

Here we see the symbol for tree, which is also used for wood in the carpentry sense; then two of the same, meaning woods or forest, with three meaning dense forest

The first figure means icicle. This symbol is a part of the ideograph for cold and is again repeated in the symbol at the right, which stands for winter

Man-made clouds. A match thrown carelessly into dry pine needles was responsible for this billowing smoke above the greenery of a western National Forest. Below, horses and mules head for the forest fire front, packing 250-pound loads of food and equipment to an Idaho fire fighters' camp.

FIGHTING THE RED DEMON

Photographs courtesy of the United States Forest Service

More than 200,000 forest fires threatened America's forest resources last year. Careless men, women, and children, and misguided woods-burners, were responsible for about ninety percent of these fires. Lightning started ten percent. In the National Forests alone, twelve fire fighters lost their lives while bringing fires under

control. The 1941 toll in trapped fire fighters, burned-out families, destroyed wildlife, and blackened timber is yet to be seen, and will largely depend upon whether American citizens show any improvement in their careless smoking habits, negligence with campfires, and other offenses against good sense.

Steady improvement in fire-fighting methods and equipment by the United States Forest Service and state forestry agencies helps to keep this tragic annual loss from being far greater. The effectiveness of modern, organized fire-fighting is indicated by the fact that, of some 32,000,000 acres burned over on the average each year for the last five years, only 2,965,000 acres burned on forest lands under organized protection. But of the total of 585,000,000 acres in the United States that needs such help, more than a quarter (152,000,000 acres) still lacks any organized protection, and even on much of the area that is defended, the forces are inadequately equipped and manned.

The war against forest fires goes on continuously, and forest defense is a part of our national defense. Like other phases of our cooperative effort, it needs the active undivided support of all citizens.

The pictures on these pages show how the battle is being fought in our National Forests.

The fire guard surveys his empire. He will be a busy man when the dry lightning storms come and the forest visitors arrive. Then it will be vital that the telephone lines be working, to assure rapid reporting of young fires to headquarters, and for calls for aid from the fire-fighting front.

Radio has an important place in National Forest protection. From the fire line a forest officer reports the progress of the fight and asks for reenforcements. Food and supplies are needed and may be dropped by parachute. Air transport is used in fighting western National Forest fires in an emergency. Or the plane may bring "smoke-jumping" fire fighters who can be dropped close to fires that have been spotted in remote areas and that are difficult of access by other means.

These aerial fire warriors were successfully used last year. "Smoke jumpers" dropped to several fires in inaccessible areas in the northern Rockies promptly controlled blazes that might otherwise have spread to disastrous proportions.

Horses do a multiple job, pulling a fire line plow uphill and down after they have delivered it, together with their own hay and grain, to the fire line in a Montana National Forest. When there is a hot fire the fighters sometimes must drop back to roads and firebreaks and back-fire against the onrushing flames in order to control them. Back of the fire fighters, however, there must be a cook camp, for fire fighters need food just as badly as do soldiers in the line. Without something against the ribs it is tough to carry on a direct attack at the fire's edge while toting grub hoes, saws and back pumps as the men are doing in the picture below.

Action on a "piny woods" fire in the Sumter National Forest in South Carolina. CCC fighters prevent a heavy loss from a fire started by a careless brush burner. The chef at a "standby" fire camp finds plenty of eager and hungry customers coming in from the front line. Fighters often get in their best licks at night. While man starts most of the fires, man, with the help of specially-adapted machinery, helps to put them out. On a Montana National Forest a Bosworth fire trencher is used to check the spread of destruction, doing so much faster than man can dig a trench.

It is tough work at the fire's edge amid suffocating smoke and heat. And after the fire has been killed and the smoke has drifted away, there stand grim reminders of man's carelessness. Only dead, worthless poles remain of what was once a valuable, green growth of timber, or ugly, charred snags are left in the fire's wake. Many years will be required to restore the impoverished soil, to bring back the wildlife and to produce a new and lush growth.

PICKET-PINS

By GAYLE PICKWELL

Photographs by the Author

They stand so stiffly erect when alarmed, these small rodents, that the cowboys call them "picket-pins" for they look like the small stakes to which the "punchers" tether their mounts. These rodents are ground squirrels of the West—two of them are illustrated here. One was met with in the meadows on the outskirts of Mount Lassen in California. It is *Citellus beldingi oreganus*, the Oregon ground squirrel. The other was studied in the meadows of Grand Teton National Park in western Wyoming. It is *Citellus armatus*, the Uinta ground squirrel.

Picket-pin ground squirrels are common within their ranges. They whistle their sharp "chee", or fill the quiet of warm midday with their tremolo voices, standing stiffly erect when an intruder approaches; when he comes too near, each breaks his erect pose and quickly disappears into the nearest burrow of the community.

The two picket-pin squirrels pictured here were studied at some length. The Oregon ground squirrel was found at an elevation of more than 5000 feet on a meadow near Mount Lassen. This meadow, bordered by yellow pines, was still verdant with grass in late June. In an area of perhaps ten acres there were many burrows and much activity. Along the highway that leads to Mount Shasta, their picket-pin forms could be seen here and there.

The Uinta ground squirrel of western Wyoming and eastern Idaho was observed during several days. It inhabited a meadow of 6000 feet elevation fringed by lodgepole pines in Grand Teton National Park. In late July the meadow was clothed largely with dried grasses and numerous seeded flower heads, rich provender for the busy rodents scuttling about gathering food.

The warning sound of the Uinta ground squirrel is a shrilly-whistled "chee", usually repeated three times.

An Oregon ground squirrel, above, surveys its surroundings, and a Uinta ground squirrel emerges from its burrow.

An Oregon ground squirrel, above, studies the camera, and a Uinta ground squirrel is frightened by it.

When a goshawk flew low, the calls were heard from all parts of the meadow. The squirrel also had a weak, rapid trill of ten to twelve notes. One was observed trilling at the mouth of the burrow, its lips opened, teeth held together. Three sharp notes merged into a rapid series of notes with diminuendo at the end.

The warning call of the Oregon ground squirrel was a single, sharp, whistled note; and rapid trills often came from many parts of the meadow.

The Teton meadow held many burrows. On fifty acres we estimated there were forty or fifty squirrels.

At times holes into which the picket-pins were seen to disappear were watched for about two hours without seeing an animal reappear. But some ran from nearby holes, suggesting connecting burrows.

Most individuals seemed to claim certain holes as their entrances, as they would return to these after a foraging trip extending over a radius of about fifty feet. They would sit up, chipmunk fashion, filling their cheek pouches. This picket-pin pose seemed to be used only to see over the level of the grass. When the ground squirrel left the burrow, it frequently, but not always, stood up to look.

Photographing ground squirrels presented problems. A camera was set up near an Oregon ground squirrel burrow where it seemed fairly certain the inmate would appear. A string attached to the shutter led back to the shade of nearby yellow pines. When the animal emerged from its burrow, sat stiffly erect and called a sharp "chee", it was the clue to pull the string.

The Uinta ground squirrel did not call when it picket-pinned at the mouth of its burrow, and had to be watched closely to photograph it before it slipped away through the grasses. Most of the photographs were obtained at the mouths of burrows.

After several days of observation and photographing we regretfully left the picket-pins' meadow, while fracto-cumulus clouds drifted across the blue sky from the neighboring Tetons, and numerous grasshoppers clacked their castanets in the pine-fringed meadow, making an accompaniment to the whistles and trills of the little squirrels.

As We See It

CONTROL OF GAME

Wishful thinking has been defined as ninety percent wishing and ten percent thinking. The definition well applies to remarks about ownership of game that assume vested interests where none exist. A game commission says that "It is every hunter's right to shoot game," and a Washington editor asserts that "the farmers must learn that you can't keep two hundred thousand people away from what they think is theirs—the wildlife of the State."

"What they think is theirs," unconscious humor though it may be, embodies the nub of the situation. There is, in reality, no ownership of game; it owns itself just as a free man owns himself. Domesticated animals endure slavery, which man has abolished for his kind, but wild animals know no master. With regard to wildlife, the controversy is about control, not ownership.

In this discussion, therefore, the word ownership will be avoided, although it is the term used in the arguments discussed. Before Magna Charta (1215) the control of wild game in England was vested in the King as an individual. After the signing of that instrument, control of game by the King was supposed to be in his sovereign capacity in trust for the people. This, the common law of England, was adopted, so far as applicable, in America. A long series of court decisions have been to the effect that the control of wild game is a function of the State. State has been interpreted to mean the individual states of the Federal union, but this decision would seem to be open to serious question because the joint authority of the states, not the partial jurisdiction of a single state, is that which corresponds to the powers of the King. Using this argument, a good constitutional lawyer with a supporting organization perhaps might sweep aside our whole web of American court decisions as to the control of game. It is an interesting fact also that these decisions as a rule refer only to "game birds," "local game," "game," and rarely "fish," leaving the remainder, that is, the vast majority of the forms of wildlife, in no man's land.

If the control of game is Federal rather than State, the whole American system, including its supporting license arrangements, is based on a fiction. Aside from that consideration, Federal control of migratory birds currently validated through treaty-making powers, would seem to make the management of migratory game birds an exclusive right of the Federal Government. On that view, the States have no authority to charge fees for the hunting of the federally-controlled species, as they now do, deriving from them much of their revenue.

Although recognized in law, such theories as to the control of wildlife are very artificial. For American law we might well go back to practices of the Indians among whom the control of hunting ground carried with it the control of game and fur, and the principle was often fought for. The parcelling of land to tribes and families, carrying with it hunting and trapping rights, formerly prevailed widely in Canada, and was properly encouraged.

The claim of the landowner or landholder to control of game is the best founded of all, and at least as far as fur is concerned, was superior to our present licensing system, because game is a product of the land. In England, from an earlier stage of whose usage our game laws derive, it is now clear that control of game goes with the land, and in the United States this is practically the case by virtue of trespass laws. To get shooting, everything has been tried from wheedling landowners to denial of the right to control hunting on their lands, and the use of threats and even force to intimidate them. So long as our form of civilization prevails, however, under which a man's home is his castle and a man's land his domain, regardless of theories, actual control of game, and of all other wildlife as well, remains in the hands of the landowner. Public agencies and sportsmen and their organizations who acquire land, by their policies toward trespassers and toward the game on their properties, show very clearly where they really think the control of game resides. Close posting and eviction and prosecution of trespassers speak much more convincingly of their practical beliefs than does any amount of argument or finely spun legal theory as to control of wildlife.

That this is a function of land-holding is the logical and practical view, and the sooner it is recognized in law the better for wildlife and for all those genuinely interested in wildlife. Even if some landholders would ignore or neglect wildlife, no matter. Making control of it tangible and transferable would soon result in most of it passing into the hands of those who are interested in wildlife and who would restore and maintain it. A property value in wildlife would better insure its safety than at present, for in our lives nothing is so cherished as property.

Conservation Comment

"Gradually it has become apparent to a multitude of Americans," says Dr. Carl P. Russell of the National Park Service, "that an important educational aspect is to be found in the public enjoyment of parks; that scenic and scientific appreciation, historical-mindedness and national patriotism are intensified through their use. The National Park Service has committed itself to a policy of preserving, and presenting by striking examples, the comprehensive and varied story of earth forces and the progress of civilization in this country. From the standpoint of scope, the Service programs now connect and constitute expression of much that is essentially American. In short, the National Park Service is situated most advantageously to develop a national perspective in social traditions and esthetic appreciation of all that America has and stands for."

It seems to us that this paragraph admirably expresses the importance of the National Park system in the American way of life that so sadly is threatened today.

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Seventeen months will be devoted to a survey of the wildlife resources of the 93,000-acre Baxter State Park in Maine. This project will be carried on by the State Department of Inland Fisheries and Game as a Federal aid activity. All species will be studied but special attention will be paid to the rare fisher and marten, once numerous in this area. The Baxter Park was the site of the last stand of the woodland caribou in the northeast. The only caribou now found in the United States are a few in a small area in northern Minnesota.

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Although the form has been believed to be extinct for many years, herds aggregating about six hundred Pacific white-tailed deer have been found in southern Washington and northern Oregon by Victor B. Scheffer, naturalist of the United States Fish and Wildlife Service. This is a sub-species known to local farmers as "tideland, or cottontail, deer". The animals are extremely wary of man and appear to have survived because they have not been extensively hunted, suffered no range competition from blacktailed deer, and because there were few predators in their region. Removal of some of the stock to non-agricultural lands is believed necessary to protect the sub-species.

• • •

A news release from the New Jersey Fish and Game Commission reports that the forest fires that spread over southern New Jersey during April are believed to have been so destructive as to "have a detrimental effect on the next hunting season." It is intimated that game birds and mammals may have suffered seriously from the conflagrations, and that the hunter may face lessened bags as a result. There is no suggestion in the release that the diminution in the numbers of wildlife will be met by closed seasons in the counties seriously affected. This would be politically inexpedient and result in loss of income to the Fish and Game Commission. Hence the usual policy of gambling with the wildlife resources will, apparently, be followed.

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An invaluable addition to fact material about one of our most beset predatory animals is to be found in the publication by the National Park Service of *Ecology of the Coyote in the Yellowstone.* This is the work of Adolph Murie, and is a 206-page report based upon long and painstaking scientific study. It has sought to discover ecological fact as opposed to hearsay evidence and unsupported prejudice. More than 5000 coyote droppings were analyzed, revealing that "during the spring, summer and fall rodents constitute by far the most important part of coyote diet, the majority of these being field mice and pocket gophers." It was found that the percentage of birds was relatively small and then, in large measure, carrion, while injurious insects constituted nearly double the percentage of birds in the diet. The role of the coyote proved not to be a harmful one during these three seasons.

Examination of winter droppings was supplemented by intensive field study. This proved that the coyote diet came mainly from the big game herds, chiefly in the form of carrion of weakened animals fallen because of the crowded range or from other causes. Special attention was given to the effect of the coyote on the trumpeter swan, that woefully reduced species, and no evidence was found that the animals preyed upon this bird. Rather, swan deaths were due to lead poisoning and starvation, among other factors.

No evidence was found to support the theory that coyotes in the Park increase in numbers and spread out into adjoining areas. Their numbers appear to be naturally controlled and the animals rarely travel any great distances. In his final summing up, Mr. Murie concludes with the paragraph:

"The National Park Service is charged with the responsibility of preserving designated areas, selected samples of primitive America, in their natural condition for the enjoyment and study of present and future Americans. In line with this high purpose the flora and fauna should be subjected to a minimum of disturbance. The natural interactions of the members of the fauna and flora and the environment have a place in such a scheme and serve to furnish significance and greater interest in the animal life. Study of early records shows that, with few exceptions, the general faunal pattern of the Yellowstone has persisted to the present time. A desirable member of the assembly of animals, the coyote contributes to the interest and variety of this fauna."

Wildlife Conservation—
1941 Brand

By EDWARD A. PREBLE

The author wishes to emphasize that in this article he criticizes no individual hunter; of course there are many types and at times he may have had individuals in mind. He himself has been a hunter. At fifteen, as was the case with most country boys, he was allowed to have a gun. He had then been interested in birds for several years, and by its moderate use as an aid to identification, he soon learned to recognize at sight most of the species in his section. Between 1892 and 1918 he collected and studied our wildlife in the interest of the Federal Government, working in most of our states, in all the provinces of middle Canada from Hudson Bay to the Pacific, and in parts of Alaska. This experience resulted in a working knowledge of a good proportion of the birds and mammals of North America, and a determination to devote his life to their conservation. Sport shooting has never held his interest, and he has not killed a wild bird for many years.

In the space available for this discussion of wildlife conservation it has not been possible to evaluate the importance of certain individuals and organizations that have exerted a constructive influence in recent years. The information they have variously made available has been deeply appreciated, and their contributions to the cause of wildlife conservation will be discussed in an article to follow dealing with specific conservation problems.

AMERICANS love to "find a a word for it," although slang credits the Greeks with this habit. Currently we are bandying about such words as "interventionists" and "isolationists," both of which have so many shades of meaning as completely to obscure their real significance. Another word that has become increasingly popular in recent years is "conservation." It is stretched to include such a wide variety of activities as building great dams for power production; draining marshes for land use; killing prairie dogs and other kinds of so-called pests; planting exotic fishes and game birds in our streams and forests; or even removing trees from our parks and forests and planting others.

It is perhaps inevitable that the enthusiasm of varied interests—both bureaucratic and private—should becloud the meaning of the word conservation. However, in the field of wildlife conservation, at least, there is opportunity to be rather specific; to weigh honestly the trends and experiences of the past and sincerely scrutinize the motives and practices of the moment.

This article, and the one to follow it, treating of threatened species, will be denounced by many on the ground that they are too critical. However, it is the systems that are criticized, rather than individuals. No close student of the subject can fail to see that the gun has been the main cause of the diminution, in some cases the extinction, of our game birds and mammals, and the gun still wields too much influence in many quarters.

Methods of "conservation" have been many and various, and perhaps no one has summed up more concisely the most conspicuous result of their operations than J. N. Darling, when he said, a few years ago, that "what we have been doing is not wildlife conservation, since we continue to have less instead of more." The record is clear on this.

Mr. Darling, while he was a public official, and after he went back to private life, seldom emphasized the part of the gunner in the diminution of our wildlife, but at least as far back as 1916 his facile pen had produced pictures that tell more in a single page than he or anyone else could spell out on the broad pages of a thick book. He had been a hunter, and no one knows better than one who has hunted, especially as a sport hunter, just what is the matter with our wildlife. But even the hunter does not always tell all he knows.

Mr. Darling, of course, was by no means the first to point out that our wild creatures are steadily diminishing. Others have issued warnings, but of our writers on wildlife probably no one had a clearer picture of the real conditions that surround our wild birds and mammals than Edward H. Forbush. A close student of our fauna since childhood, possessed of unflagging energy and enthusiasm, with experience in many parts of the country, and with the ability to write clearly and pleasingly of what he learned, his words always carried conviction.

In *Useful Birds and Their Protection,* 1907, Forbush says: "A mere glance at the history of game legislation in Massachusetts or any other eastern state is enough to make one wonder that any native game now exists. From the settlement of Massachusetts until 1817 there was practically no limit to the amount of bird shooting that anyone might legally do at any time of the year. Until that time the only legislation enacted regarding birds provided bounties for their destruction. Among other species, the ruffed grouse or partridge was the victim of local bounty laws. By 1817 most of the larger game mammals and game birds were nearing extermination, and people were beginning to shoot robins, larks, snipe and woodcock, in place of larger birds. A law was then passed protecting these birds from March 1 to July 4, and partridge and quail were protected

from March 1 to September 1, but this law was nullified locally by town option, for any town meeting could annually suspend its operation.

"The most stringent game legislation of the middle nineteenth century period was a series of acts not for the protection of the birds, but for the benefit of the people engaged in netting wild pigeons. The penalties for disturbing pigeons about nest beds were heavier than for merely killing game out of season. They even included a term in jail.

"It would be ludicrous, were it not pathetic, that we withhold adequate statutory protection from game birds until they are practically exterminated. Protective statutes come too late."

In 1817, the period to which Forbush refers, most of the country west of our Atlantic Coast states was practically an untouched wilderness. But this was soon to change. With increased settlement the condition in the East spread rapidly to and beyond each of the succeeding frontiers.

W. T. Hornaday, in 1913, said: "The time was, thirty or forty years ago, when wildlife was so abundant that we did not need to worry about its preservation. That was the golden era of study and investigation. That era ended definitely in 1884, with the practical extermination of the wild American bison, partly through the shameful greed and partly through the neglect of the American people. We are now living in the middle of the period of extermination." And until his death in 1937 he worked with unflagging zeal and energy to defer the extermination he feared, literally giving his life to the cause, for even when he knew he was on his death bed, he continued the fight in behalf of the wild creatures that he loved.

HOUGH AND ZANE GREY

Emerson Hough, well-known sportsman and writer, said in 1912: "There is no well-posted sportsman in America, no manufacturer of sporting goods in America, no man well versed in American outdoor matters, who does not know that we are at the evening of the day of open sport in America. . . . Our sportsmanship has failed. Our game laws have failed, and we know they have failed. Our game is almost gone, and we know it is almost gone."

Ten years later, on the first page of the first number of the *Izaak Walton League Monthly,* August, 1922, he published his notable editorial, "Time to Call a Halt." He appealed to Americans to stop the waste of our resources, and to wipe out the taint of greed and commercialism that had been laid upon them. "Can any human agency," he asked, "work the great miracle of giving the ages a part of the America that was ours? . . . Can this weak, new, little journal, openly established as a pulpit of heresy to the orthodox selfishness and commercialism in sport, work that vast miracle? I do not know, I dare not predict. But may we not all at least join that clean hope? Surely, if it also shall fail, then all hope of outdoor America has failed and failed forever."

In the second issue of the same periodical, Zane Grey, noted novelist and Nature writer, joined Hough in a similar appeal to all outdoor-loving people. He said, in part:

"My ideal and motive are identical with his. Moreover my work has been wholly concerned with the beauty and wildness and Nature of America, all of which are vanishing.

"But I am more hopeless than Mr. Hough. I see only one possibility of preserving the game and fish, and something of the natural beauty of wild places, and the purity of inland waters. And here it is. If a million outdoor men who have sons will think of these sons, and band together to influence other men who have sons—then we may save something of America's outdoor joys for the boys. . . .

"My appeal is not to save game and fish for sportsmen. I have forgotten the sportsmen. I do not care anything about saving game and fish for sportsmen. I want to save something of vanishing America. . . .

"It is a serious thing for any writer to take up his pen against so-called sportsmen, and their peculiar ways of being happy. But it is necessary that this should be done. . . .

"Naturalists and biologists and true lovers of Nature either despise or disapprove of sportsmen. There is justice in this. Something is wrong. Our heritage of outdoor pursuits is certainly a noble and splendid thing. . . . Nevertheless sportsmen, as a mass, are hypocrites, and are blind to the handwriting on the wall."

CAUSE OF DECREASE

These passages, written by men who had been hunters, should make it apparent that for many years our game species have been decreasing faster than they could increase by breeding, and that the gun has been the main factor in their decrease. But North America had always been a land where hunting was free. It must remain so, the hunters reasoned. As the game continued to decrease, natural enemies, weather and diseases were blamed. Importation, transplanting, and control of predators were invoked. The first necessitated closed seasons to allow the immigrants to increase; the second robbed one section to help another; the third increased disease so that the native species continued to dwindle. Plans, policies and programs were inaugurated, but selfishness always prevailed in planning and administration. Weapons and killing methods increased in efficiency, leading to competition between groups of killers for the fast decreasing stocks. Many hunters, and occasionally even a representative of the ammunition interests, pointed out the hopelessness of the outlook, but the advice of all was unheeded.

Special licenses were adopted, new organizations were formed, large sums were contributed by industries that benefited by hunting—but all the time our larger species, and the smaller non-game species that were gradually requisitioned to serve as targets for the guns that were carried by more hunters—all decreased. What other result could follow?

For many years most of our states have had game commissions or similar organizations. In earlier times our stocks of resident game, especially the birds, had shared with the migrants from the North the burden of maintaining sport, but years ago our resident game became so

much depleted that most of our states were forced to rely on stock raised in Alaska and Canada to a continually increasing degree to satisfy the larger numbers of hunters that took the field from decade to decade.

LICENSE SYSTEM

Hunting licenses bring to the state organizations from year to year not far from $1.50 from each hunter. What is more natural than that the states should continually try to sell as many licenses as possible? The more licenses, even at so paltry a price, the more money. Having taken the money, the state must make a gesture toward delivering some game to keep the hunter satisfied. Some states even point out that each hunter under his license may take so many head of game, sometimes expressed to pounds, like meat. Of course, hunting under such circumstances becomes a matter of competition as to who shall find the game. To augment the natural supply the state raises some pheasants, imports some rabbits, or adds the red squirrel or the blackbird to the game list.

It is necessary, of course, that in each state there must be some organization whose duty it is to administer the game laws, but it must be evident to any unprejudiced observer that our present system of pretending to keep up the supply of game by the use of a dollar and a half from each hunter, even with the help of migrants from the North, is a ghastly farce. When a state administrator congratulates the hunter on the large return that he gets on his one-fifty investment, we wonder what process is going on in their respective minds. Mississippi had no regularly organized game commission until 1932, but it does not appear that its game has suffered worse treatment than that of neighboring states.

W. T. Hornaday, in 1930, referred to our state-licensed gunners as 48 armies of destruction. In 1911, there were upwards of 3,250,000 hunters, with game of all kinds already on the decrease, but still present in most of our states. But as large as this number seemed to be, the succeeding decades were to witness a steady and astonishing increase. In 1922, the licensed hunters numbered 4,341,098; in *1925,* 5,332,375; in *1927,* 6,462,555; in *1930,* 6,960,934; in *1936,* 6,658,158; and in *1939,* 7,646,193. For details as to states consult table on page 404.

If the figures seem not to increase as fast in proportion as the years go by, just recall that the gunners of today are pursuing a remnant of game so pitifully reduced that the mind of the naturalist recoils from the task of discussing it. We can tabulate the numbers of licensed hunters, because these are published every year, often with the implication that the increase in the totals of state and nation are matters for congratulation. But what this increase of hunters means to the hunted game is a different matter.

FIGURES OF KILL NEEDED

If, instead of the census of gunners, the numbers of the various game species that were killed each year in each of the states could be presented, the same story would be told in a different way. But, in general these statistics are not available, for, although state officials recognize the value of such figures, and, in perhaps half of the states have attempted to obtain them, most officials have been discouraged by the poor response to their efforts. However, the best figures obtainable indicate an average individual bag so small that one wonders why the most optimistic hunters are willing either to buy licenses, or to pursue the pitiful remnants of game now available.

In Wisconsin, a state that was originally well stocked with a great variety of real game birds and mammals, and which still sells nearly 300,000 licenses, one finds that the average hunter's small-game bag under present-day conditions, exclusive of waterfowl, is about as follows: four rabbits; less than four squirrels (including gray, fox, and red); one pheasant and a half; one-half a ruffed grouse; one-fourth of a prairie chicken or sharptailed grouse; one-fifth of an introduced Hungarian partridge; and a mere fragment each of a rail, woodcock, and snipe.

In Pennsylvania, whose hunting licenses and grants from the gun and ammunition tax moneys permit bounty payments, game refuges, importation of exotic species, and a warden service competent to arrest and bring to justice thousands of game law violators each year, we find that in 1940 the average bag for the season for each of 675,000 hunters was approximately as follows: four and one-half rabbits; one and one-half squirrels (fox, gray and red); one-fourth of a woodchuck; one-twentieth of a raccoon; a mere fraction of a turkey, a goose, and a shorebird of some kind; nearly one-third of a ruffed grouse; two-thirds of a pheasant; one-tenth of a quail; one-fifteenth of a woodcock (this bird said to be scarce and well it might be after the tragedy of the previous winter); one-eighteenth of a duck; and about one-twentieth of a blackbird. There was also quite a kill of deer, probably justifiable, and about 500 of the hunters had killed a bear.

While these comments on the kill involve no special criticism of the state officials concerned, certainly they indicate the deplorable state to which our beautiful native wild creatures have been driven.

FEDERAL STATUTES

Federal wildlife protective laws are necessarily confined to migratory birds and to interstate commerce in wild animals and their derivative products. The beginnings of Federal protection began in the three decades preceding 1900, but the first law to be passed was the Lacey Act, first introduced in Congress in 1897, and finally enacted in 1900. It forbade the importation of noxious animals killed in defiance of state laws, and drastically limited interstate commerce in game. Certain provisions of this Act to enlarge its powers were incorporated in the Penal Codes and later of the Migratory Birds Treaty and its enabling Act. It is administered by the U. S. Fish and Wildlife Service, and is effective in many ways.

The Migratory Birds Treaty Act, one of the most important and worthy conservation accomplishments that was ever consummated, had its beginning with the introduction in Congress by George Shiras, 3rd, on December 4, 1904, of a bill to protect migratory game birds. For

various reasons this bill received little attention in Congress, and it was not until March 4, 1913, that the Weeks-McLean Bill, having similar motives, was finally enacted. This gave the Department of Agriculture the power to fix closed seasons, but few other powers. Nevertheless, the law had a profound effect on the public mind, especially because shooting of migratory waterfowl in spring was stopped.

When this bill became law, the U. S. Senate adopted a resolution memorializing the President to negotiate treaties with other countries for the protection of migratory birds, and this resulted, in 1916, in the ratification of a treaty between the United States and Canada, and in 1918 of the Migratory Birds Treaty Act. It was certainly sorely needed, but some of its most important features did not suit certain organizations. It clashed with privileges that had long been enjoyed by many states possessing ideal conditions for the winter entertainment of the waterfowl hordes that were raised in Canada and Alaska. Long seasons and large bag limits were considered rights; in some states Federal "interference" was resented, even after attacks on the measure had resulted in court decisions upholding the justice of Federal authority.

DOLLAR LICENSE

One of the evidences of this unwillingness to abide by the Treaty Act was the introduction in 1921 of a bill that required every waterfowl shooter to buy an annual license of the Post Office Department for $1.00, about half to be used to purchase land for refuges and public shooting-grounds, and half for their administration. This bill nearly passed in 1922, and continued to be introduced at intervals, under different titles, until 1928. Its last appearance still contained the "shooting-grounds" feature, but this fault was remedied, and on February 18, 1929, the new Act, generally called the Norbeck-Andresen Sanctuary Act, was signed by President Coolidge. It called for inviolate sanctuaries, and authorized yearly appropriations of one million dollars for ten years. There was a great outburst of enthusiasm from all sides. Organizations that had worked for years to pass the bills with the shooting-grounds provision now claimed a lion's share of the credit for the new Act, suppressing for the moment the disappointment that came with the loss of the dollar license, which the Secretary of Agriculture had admitted "would maintain for the residents in both country and town large opportunities for continued wildfowl shooting that will be impossible in any other way. It might, in fact, be stated that it would provide Federal shooting clubs for the benefit of the general public at the nominal cost of a Federal hunting license of $1.00 a year."

The "authorized" appropriations for the Sanctuary Act came slowly. Just why this was so, at a period that was soon to witness unprecedented expenditures for numerous projects, was probably known to many, but we have not seen the answer. At any rate, it was soon evident that the Act providing for inviolate sanctuaries was not altogether satisfactory to the gunners. They seemed to wish to be taxed a small sum as insurance against closed seasons.

DUCK STAMP PLAN DEVISED

By 1932 the sporting interests had scented a way, but they still differed among themselves as to details. Should it be a tax on shells, or on guns, or a one-dollar license? This was one of the main questions argued at a three-day Senate hearing on waterfowl in April. Eventually the "duck stamp" was chosen and a bill was drafted. Of course, there was opposition in some quarters, and its proponents were not sure of success. A month before its passage the editor of *Field and Stream* urged instant action, saying:

"Then the duck shooters of this country can demand their rights on the basis that they are going to put up the money to buy nesting, resting and feeding grounds to assure waterfowl the protection they must have if we are to continue to enjoy the sport of hunting them. . . . It is true that one of the sportsmen's magazines has not endorsed the Duck Stamp Bill a hundred per cent. It is asking its readers to demand the $1,792,475 direct appropriation which is past due under the Norbeck-Andresen Act. . . . If you are going to sit back and wait for someone else to interest himself in your behalf and pass this legislation, it won't be passed, and next year you may have to lay aside your duck gun. But if every man who reads this editorial will write his representative at Washington at once and get his friends to do likewise, there will be no closed season next year."

So the Federal migratory bird hunting stamp was authorized in 1934, the stamps to be issued and sold each year by the Post Office Department, as had been planned fourteen years before. Each waterfowl hunter over 16 years of age must buy one, which must be affixed to his state permit. "Not less than 90 per centum shall be available for location, ascertainment, acquisition, maintenance, or development of suitable areas for inviolate migratory bird sanctuaries. . . . The remainder shall be available for the expenses in executing this Act, the Migratory Birds Conservation Act, the Migratory Birds Treaty Act, and any other act to carry into effect any treaty for the protection of migratory birds." Sounds fair enough, one may say, but those who saw through the sophistry that lay behind the plausible assurances of its proponents foresaw what was to happen.

PROMISE FULFILLED

Most people had forgotten what the editor had said a few weeks before, but he seems to have been justified in his promise. There has been no closed season, and there is not likely to be one as long as the duck stamp is in operation. In August, 1935, a prominent eastern sportsman, in answer to my question as to his exact meaning in a somewhat cryptic essay he had written, answered: "Yes, you got me right. The duck stamp has turned out to be a curse, not a blessing." He and his friends have come to realize the serious condition of the waterfowl and had tried to bring about a closed season.

And what an efficient weapon has this simple and low-priced device turned out to be! Designed and advertised while the ducks of last year's hatch are still falling be-

fore the hunters' guns, manufactured while the survivors are mating and moving north to their nesting grounds, on sale before the later of the season's ducklings have emerged from their shells, this little stamp gives to each hunter who has the time and means the right to follow the South-faring birds from our northern border through three—perhaps four—months of shooting. With another license, he may go on to Mexico, and shoot 70 days more.

When the so-called duck stamp was first issued, an opportunity was afforded to ascertain the annual kill of waterfowl, a factor that permits close calculation of the entire population present. Senator Hawes, at the first Wildlife Conference in February, 1936, pointed this out, as follows:

"The bill provides an opportunity for securing, by new applications, vital statistics regarding the kill of the previous season. In fact, it is the only exact method of ascertaining what actually happens. A new license should not be issued until the applicant has given the exact number of migratory birds killed by him during the preceding year. This would assure some degree of accuracy in the ascertainment of the annual 'kill,' stop the absurd guessing which is going on, and forestall some of the foolish estimates that cannot possibly be based upon accurate reports."

The application (Form No. 3332), issued in 1934 by the Post Office Department, does, indeed, call for an exact statement, by the individual stamp purchaser, of the number of days he hunted, the locality, and the number of ducks, geese, and brant killed by him. It does not appear, however, that any serious attempt to follow up this matter was made, and the guessing and estimating referred to by the Senator have been going on ever since.

PITTMAN-ROBERTSON

The Pittman-Robertson Act, effective July 1, 1937, authorizes Congress to appropriate annually sums not exceeding the revenue from the 10 percent tax on sporting arms and ammunition. After deductions to cover administration, the funds are apportioned to the states eligible to receive its benefits, "half in the ratio of the land area of each state to the United States as a whole, and half in the ratio of the number of the state's paid hunting-license holders to the total number of hunters in all states. The states must contribute $1.00 for each $3.00 of Federal funds." The principal types of work contemplated are: Purchase of land; development to increase its suitability for wildlife; and research in problems that stand in the way of wildlife restoration. It must be pointed out, however, that certain features inherent in the Act itself, and which were pointed out by veteran students of wildlife protection when the matter was first brought up in 1936, militate against its efficacy for conservation.

It is well established that shooting is the principal cause of the decline in our wildlife. To furnish the funds that will help under this program, shooting must continue, with continual further decrease of our supply. This, of course, will result in more funds, but less wildlife will be left. But the season cannot be closed, or funds would stop. And so on, and on, and on.

We must also not forget that the natural tendency is for the states to increase the number of licensed hunters. Some organizations have gone so far as to bemoan the fact that the devotees of baseball and other outdoor sports greatly outnumber those who hunt and fish. For, some say, the hunter is the best friend of the game, and the fisherman of the fish.

The writer agrees entirely with a friend who said, when this bill became law, that "it means 90 percent of destruction and ten percent of protection." The history of wildlife "conservation" in America, as elsewhere, wherever conservation has been financed by a part of the license money collected, has resulted in "less instead of more." And now we have this lessened stock being persecuted by more hunters than ever, and expect our species to increase in numbers by studies financed by a 10 percent tax on the guns and shells that kill them!

When we learn that the Burglar's Union has made it possible for its members to purchase licenses to steal, and that a ten percent tax on the jimmies, dark lanterns, safe-cracking tools, dynamite and electric drills used by them is pooled to maintain a corps of detectives and police to protect the public from robbers, *and the plan works,* then we will admit that possibly wildlife can be saved by taxing the weapons that destroy it.

FEDERAL REFUGES

Refuges for certain species or groups of persecuted birds had their beginning in North America in 1903, when a large breeding colony of brown pelicans in Florida was set aside as a refuge. Other similar areas were soon dedicated. The system has been expanded, especially during the last few years. Those refuges administered by the Wildlife Service now number 267, of which 178 are primarily for migratory waterfowl and the rest are set aside for various types of birds and mammals. Other areas, large and small, include the National Parks and Monuments, under the jurisdiction of the National Park Service, and some areas in the National Forests. Most of these are inviolate, but a few still have shooting grounds on or adjoining them. It is distinctly unfortunate that the Fish and Wildlife Service has to depend in part on proceeds from the Migratory Birds Hunting Stamp and the Pittman-Robertson Aid to Wildlife Act for funds to administer these refuges, instead of being given direct appropriations. Dependence on these sources of revenue undoubtedly hampers the Service in its endeavors to give wildlife its just deserts. These refuges are of outstanding importance, and their integrity depends on the maintenance of adequate breeding stock, which at times may demand closed seasons.

MORE GAME BIRDS SET UP

This organization, sponsored by a group of wealthy eastern hunters, interested mainly in waterfowl shooting, was formed in 1934. Its purpose, as is proved by its subsequent actions, was to increase shooting privileges. By the influence that some of its leading officers were able to exert on a number of popular magazines of wide circulation, the wide dissemination of many plausibly-written and (Continued on page 404)

PHOTOGRAPH FROM J. HORACE MC FARLAND

MANY DIFFERENT HERBS FLOURISH IN THIS GARDEN

In the foreground is some luxuriant horseradish and the other herbs include rue, sage, wormwood and tarragon, growing in the shade of apple and quince trees

Herbs In a Warring World

By ANDREW S. WING

POPULAR favor in the plant world revolves in cycles just as do many other things. Now it is herbs that are back in style. We call them "urbs", the old original pronunciation; the English say "herbs"; while a few folks still cling to the early American "yarbs". No matter how you say it, these interesting, aromatic and healthful plants are again in as high favor as they were back in the dawn day of gardening, when black-frocked monks made gardens within their walled sanctuaries. And war is one reason for their popularity.

The monks ranked plants as high for their medicinal value as for their usefulness on the table. Indeed the earliest doctors and medicine men in all lands have been growers or at least gatherers of herbs. To the legitimate medicinal content of the plants were added such weird substances as dragon's blood, bat's teeth, and snake oil. When brewed with the proper incantations and magical hocus pocus, the patient who took them in good faith frequently got well. Yet on the early wisdom gained by these old-time herb doctors is based much of our medical knowledge of today.

The use of herbs for cooking and for perfume also came into being at an early time. Many a tainted piece of meat was made palatable by the addition of aromatic herbs, while in the hot, dry countries perfumes helped overcome the lack of bathing facilities. Our current interest in herbs is more civilized. We prize them because they are attractive additions to the garden and because they pay their way into our kitchens by adding flavor to our food and elsewhere in our homes perfuming our rooms or wardrobes.

When the current vogue for herb gardens began, ten or fifteen years ago, it was the more artistic gardeners who first took them up, doing so as much for literary or sentimental reasons as for their practical garden value. Later on, ordinary dirt gardeners awoke to the fact that there was real sense to this herb fad. Now almost everyone has a few herbs in the garden whether he realizes it or not. Mint, chives, parsley, sage—all are herbs and useful ones. Salt, pepper and mustard are all the condiments one needs, but really fine cooking demands different and more subtle flavors. And so herbs are now on the "must" list of every good kitchen gardener.

The disruption of trade with continental Europe, whence came our principal supplies of herbs, essences and essential oils, has brought another factor into the current interest in herbs. A number of these imported products are really important to us. Until the war is over and ordinary channels are again opened, there will be a shortage of these roots and essential oils, and there will be a chance for profit for those who can grow them at low cost in this country. Americans should not, however, get any fancy ideas about getting rich out of the herb business. It is a game that requires a few years to learn, and by the time it is learned we may again be in competition with peasant labor in the Old World.

The National Farm Chemurgic Council has been surveying the situation and finds that it may be possible to make money out of herb crops in this country, even in

ROSETTA E. CLARKSON STANDS AMONG HER HERBS

PHOTOGRAPH BY V. J. BRISTOL

In her Connecticut garden she grows more than three hundred different herbs, and has written about them in two delightful books—"Green Enchantment" and "Magic Gardens"

normal times, if we learn how to handle them with modern machinery and methods. It further believes that we can, in some cases, grow better quality products than those produced abroad.

The importance of these essentials oils and roots is greater than most of us realize. Licorice roots, for instance, were imported at the rate of $1,250,000 a year in 1937 and 1938. We imported 25,000,000 pounds of caraway seed worth more than $1,500,000 between 1935 and 1938 inclusive. During this same period a million pounds of oil from anise seed was brought in, costing us a cool million dollars, which we might just as well have kept at home.

What are some of the uses of these essential oils that we hear so little about in everyday life? Coriander, for instance, is a plant that is just a name to most people. A native of southern Europe and Asia Minor, it is mentioned in early Egyptian and Roman literature. It was used to keep meat from spoiling. The seeds or oil were used to flavor bread, sausage, curry, gin and certain liquors. The plant is an annual that grows about two feet high and the leaves and unripe fruit have an unpleasant odor and taste. This accounts for the name, the Greek word *koris* meaning bedbug. The ripe seeds, which are round and rather large, taste and smell like orange, but with a distinct quality of their own.

Coriander was introduced into Massachussetts before 1670. While it was used by early colonists, and is in common use today, there is no record of its having been grown here except as a kitchen herb or in experimental or botanical gardens. It is cultivated mainly in Russia, Moravia, England, Morocco, Germany, Hungary and Bulgaria. The best coriander comes from Russia, Moravia, and Hungary. It is grown in rows and does well on almost any sunny, fertile, well-drained soil. Research has showed that it can be successfully grown in Kentucky, and it has also been grown in Ohio.

The oil of the coriander seed flavors candy, canned foods, catsup, chili sauce, condiment sauces, and mayonnaise. It is used to flavor pickles, soups, spice extracts and tobacco. As a perfume it goes into soap and other scents; and it is an important ingredient of gin and various cordials.

Coriander is only one of the important essential oils that we have been in the custom of importing. Others are caraway, anise, fennel, angelica and licorice. The useful parts of the last two are the roots. All are used in foods, candy, perfumes, liquors, and beer. Angelica oil is used in flavoring Chartreuse, and some varieties of vermouth and gin. Licorice goes into candy and chewing gum, cough medicine, and even into fire extinguishers as a stabilizer. After the oil has been extracted, the herb pulp can be used for feed and in other ways. Very useful products, these herbs!

But let us get back to the garden and the common kitchen herbs that we can grow and use at home. One can start with a few and go as far as one's fancy dicates. I recently visited the famous herb garden of Mrs. Rosetta E. Clarkson of Milford, Connecticut. Mrs. Clarkson, who might be called the high priestess of the herb cult in the United States, is a friendly, unassuming person, who developed a liking for herbs and herb lore by studying Shakespeare and sixteenth century literature. The more she read the old authors, especially the old herbals and garden books, the more intrigued she became. She began growing these plants with the quaint names and histories, and before long she had so many that she had to move her

garden from the suburbs of New York to a larger tract on the Connecticut shore. Here, in a curious, fascinating garden of perhaps an acre, she cultivates, studies and writes about 300 varieties and species of pot, aromatic and medicinal herbs.

Here one may wander about between beds divided by gravel paths into interesting geometrical designs. There is a group of mints ranging from ordinary spearmint to white and orange mints, and the black peppermint from which the commercial essence is distilled. Here is wormwood from which comes the devilish absinthe; there is its cousin tarragon, from which one can easily make the tasty tarragon vinegar, so beloved by epicures. Southernwood, *Artemisia abrotanum,* has many uses, from a vermifuge to a hair restorer. It is said also to keep ants away and has been used as a love charm.

PHOTOGRAPH FROM J. HORACE MC FARLAND

CATNIP IS, OF COURSE, AN HERB

Its popular name is typical of the many fascinating names of herbs—bee balm, dusty miller, heal dog, lark's heels, sesame, pimpernel, costmary and others

Sweet Alice, bee balm, dusty miller, heal dog, horehound, lark's heels, sesame, pimpernel, Good King Henry, costmary or goose tongue, rosemary, tansy—these just a few of the quaint-named herbs picked at random. The names are as old as the English language, some of them older, and their roots grow deep in the medical and folk lore of European civilization.

An herb garden will not give you a riot of color, yet it has a fascinating range of colors on the subtle side, especially in the olive greens of the foliage, while some of the flowers, such as the purple, clover-like heads of chives, are attractive enough to use as edgings in almost any garden. A small clump of chives from the corner grocery will, in a few years, if divided every spring, multiply sufficiently to border all your paths and have some left over for the neighbors. For that reason, and because the chopped green stems are extremely good in cottage or cream cheese, or in soups or salads, this mild little onion would go at the top of my herb list.

Everyone has his favorite list of herbs. My wife, I suppose, would choose parsley because of its usefulness as a garnish. Of the dried herbs that are easy to grow, I presume most gardeners would rate sweet basil close to the top. This is a leafy annual that can be used fresh, or the leaves, dried and kept in a jar, will do wonders for scrambled eggs or omelets. It is also widely used to impart interesting flavors to tomato, fish, cheese and salad dishes.

Almost every family has a mint bed for flavoring lamb sauce and, perhaps, mint juleps. The common one, of course, is spearmint, a European introduction that has run wild in many of our lowlands. But the mint fanciers turn up their noses at plain mint, rating it as coarse and lacking in that subtle essence that a fine mint should have. So you can have double French mint, if that will make you any happier—a variety with a foreshortened stem and curly leaves that is more manageable and more attractive than the ordinary field variety, although the flavor is much the same. But if you really know your mints, you will not be satisfied until you also have the orange and the golden apple mints, and perhaps the black peppermint, which is a variety grown by the commercial mint farms and from which our peppermint candy and chewing gum gets its flavor. Mrs. Clarkson has confined her mints to their allotted spaces by means of iron bands (old auto license plates will do), as they have most invading habits.

Sage is another "must" for most gardeners, and is one of the few herbs that never went out of use on farms and in villages where folks still make their own pork sausage. Sage is a long-lived perennial, becoming bushy as the years roll by. Because of the exquisite flavor it imparts to salads, stuffings and meats, sweet marjoram is rated as highly by modern herbists as it was by the Elizabethans.

The thymes are an interesting family in many ways, and the creeping thymes are worth having in the rock garden or dry border because of their habit of covering up old rocks and bare spots. Rub a bit of thyme between your thumb and forefinger and you get a most delicious spicy odor. Mrs. Clarkson recommends keeping a jar of what she calls her "big four" (a mixture of sweet basil, summer savory, sweet marjoram, and thyme) in the kitchen at all times for use in soups, salads, stuffings and chopped meats, finding that they combine well with all of these dishes. Yet she advises against using such a stock mixture too often, as variety is the spice of the cook who knows the uses of herbs.

Thus far we have been considering mainly the herbs that are used for cooking—the kitchen or pot herbs. Fragrant herbs and medicinal herbs are equally important, although not so widely grown in home gardens. "Mignonette, heliotrope, lemon verbena, Bible leaf, lavender, marjoram, rosemary," writes Mrs. Clarkson, ". . . collected fragrances out of the past recall to our hearts half forgotten memories, imagined scenes. . ." There are those today who not only preserve these (Continued on page 405)

Myakka's Golden Gar

By GUY VAN DUYN

A STRIKING example of freak pigmentation in a fish came to light recently in Florida at Myakka River State Park, one of the many state parks now undergoing development under the joint supervision of federal and state agencies.

Early in March, 1940, Walter McWhorter, of the National Park Service, reported a "red gar" in the deep water of a highway ditch connecting with Vanderipe Slough, which empties into the Myakka River.

During the next several weeks the same fish was frequently observed sunning itself at the surface, never far from the spot where it had first been discovered, and in time our "Golden Gar" became the subject of much discussion and speculation. It was a small specimen, about a foot in length, but what it lacked in size was made up in brilliance of color. In the still and clear dark water it appeared as red as the gaudiest of goldfish. Otherwise it seemed to be a normal, healthy fish, although it was never observed feeding. Always it was alone, too, seeming to shun its fellows.

A little later "Mac" and the writer attempted to capture the prize, to transfer it to the safety of the park's artificial pool. A cane pole with a fine wire noose was used in the attempt, but this usually dependable implement proved a complete failure. Not unlike albinos among the higher vertebrates, this freak proved exceedingly wary and was seemingly quite aware of his conspicuousness. At anything like a close approach he would disappear in the depths, to reappear presently at the surface—always well out of reach. Capture was finally effected, however, through the deft cast-net heaving of Superintendent Claude Ragan.

Brief examination classified it as a spotted gar, *Lepisosteus oculatus,* minus the usual spots or other characteristic coloration or markings. Its total length was exactly thirteen inches. On close inspection in the hand it appeared less red than in the dark water of the ditch; nevertheless its back was a uniformly lustrous golden, the opercles and other plane surfaces of the head being of iridescent brilliance. On the sides a gradual transition terminated in a pale, lemon-yellow abdomen. All fins, including the spatulate caudal, were suffused with streaks of vermilion. Even the iris was golden, vividly set off by the jet-black pupil.

In the clearer medium of the fish pool, fed by the overflow of sulphurous water from an artesian well, the vivid hues, although actually unchanged, took on the appearance of a uniform dull yellow.

The strange visitor immediately became an object of curiosity to residents of the pool. Several foot-long largemouth bass quickly approached for a better look at the newcomer, one even going so far as to nibble tentatively at his tail fin. The gar soon went into seclusion under an overhanging bank.

Since then most of his daylight hours have been spent hiding in such situations. Presumably, feeding is done at night for, although his condition continues good, he has never been observed in the act.

As yet we have been unable to learn of any other cases of freak coloration in gars; certainly they must be considered to be a distinctly rare oddity in the fish world.

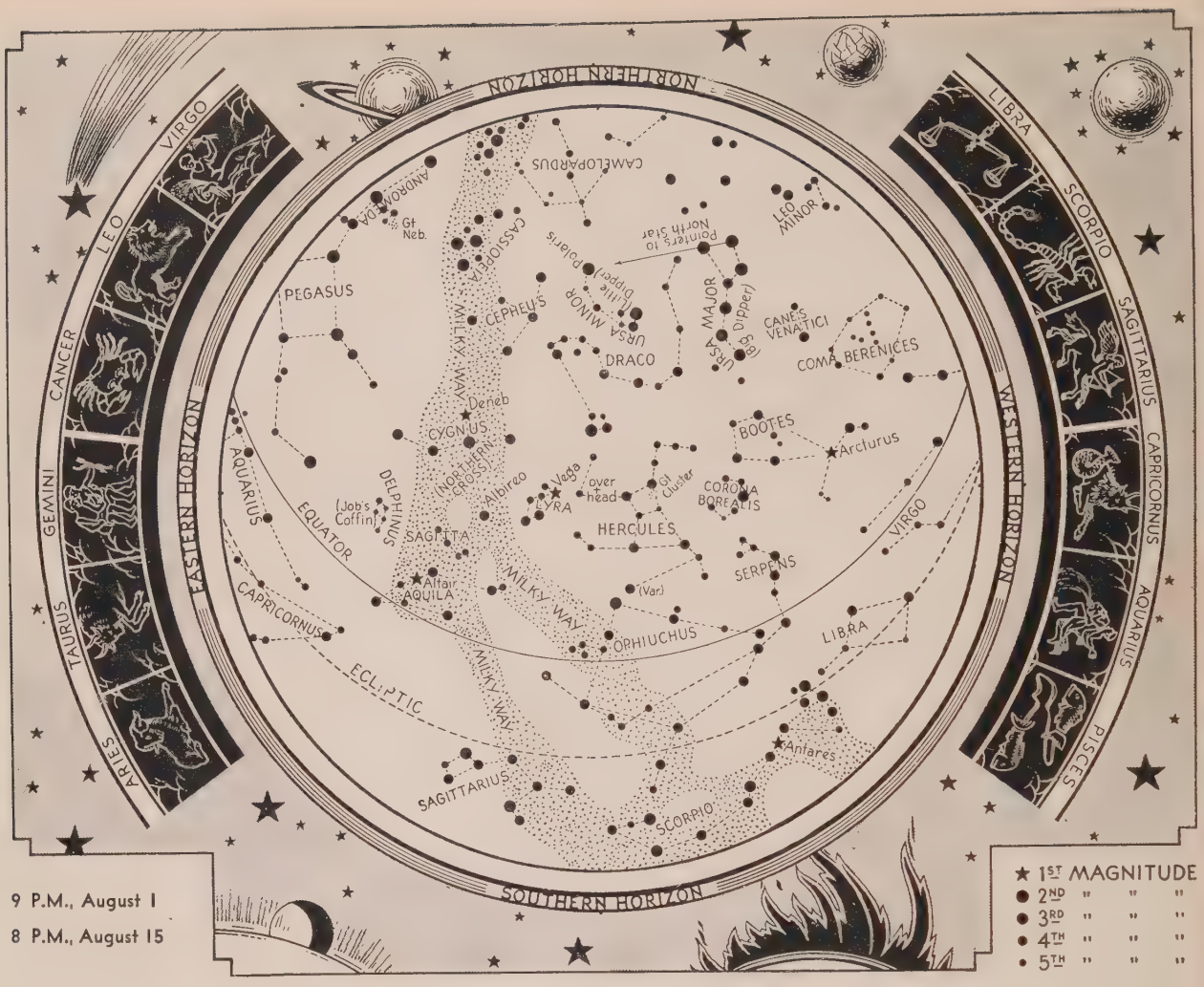
•

HE SINGS BEST

By ETHEL ROMIG FULLER

He sings best
Who sings in a hush
Of lonely peaks,
Like a hermit thrush.

Tossing his song
To the empty air,
None to applaud,
None to care.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

August and September Heavens

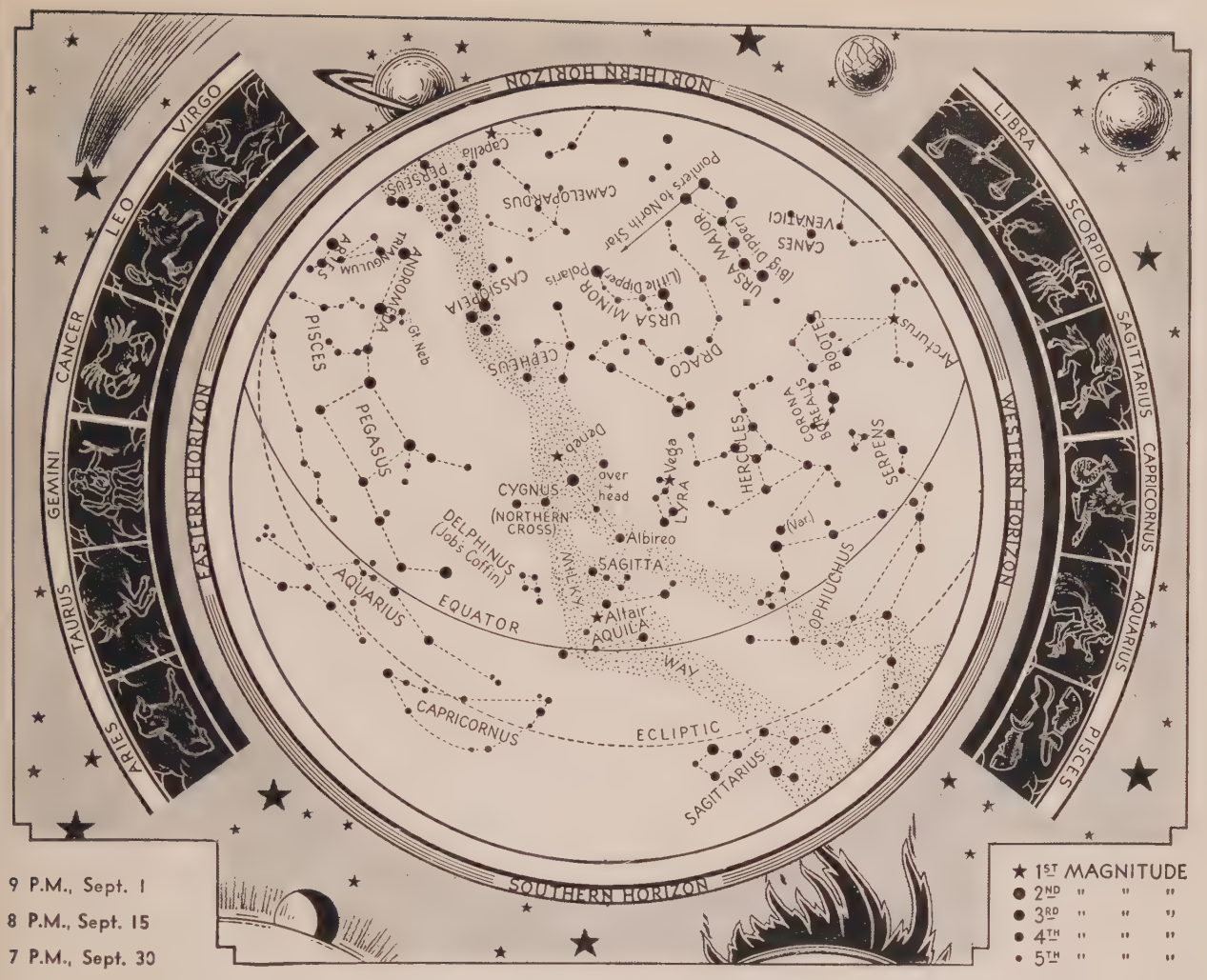
By ISABEL M. LEWIS

THE OUTSTANDING astronomical events of these two months will be the total eclipse of the sun on September 20-21, Eastern Time, and the approach of Mars to the most favorable opposition that will occur for fifteen years to come.

Mars has been drawing nearer to the earth and increasing in brightness for some months now. During September it will first equal and then—by the end of the month—even surpass Jupiter in splendor. It will be closest to the earth and most brilliant on October 3, and in opposition to the sun a week later. Thus Mars will be at its best for observation in September and October. It is only at these times of closest approach to the earth that one may hope to see with a powerful telescope the two tiny moons of Mars, Phobos and Deimos. Phobos is the nearer and brighter of the two and about ten miles in diameter; the other is even smaller. Phobos makes three revolutions around the planet in less than one Martian day of about 24 hours, 37 minutes. Deimos takes about 1 day, 6 hours, to complete one trip around the planet.

Mars will be in Pisces during these two months and will rise about two hours after sunset in the middle of August, and almost with the setting of the sun by the end of September. It will then be the most conspicuous object in the evening sky. At this opposition the south pole of the planet will be turned toward the earth. At nearest approach to the earth it will be at a distance of 38,130,000 miles. Its nearest possible approach at any opposition is about 34,500,000 miles, and it came this close to the earth in August, 1924.

There will be an eclipse of the moon as well as of the sun in September, but the eclipse of the moon on September 5 will be a small partial eclipse in which only six hundredths of the moon's diameter will be in the earth's shadow at greatest eclipse. It may be seen in the Pacific Ocean, the northwestern extremity of North America,



Asia, Australia, the Indian Ocean and the greater part of Europe and Africa.

The total eclipse of the sun occurs in the eastern hemisphere on September 21, but in Eastern Standard Time starts in the late evening of September 20 and ends early the following day. It will be seen at its best in China at midday, where the sun will be totally eclipsed for 3 minutes and 21 seconds. We might appropriately call this a "war zone eclipse" for in either its partial or its total phase it will be seen in the Red Sea, the eastern extremity of the Mediterranean, Iran, and Iraq, the region of the Black and Caspian Seas, and practically all of Asia, most of the East Indies, with the exception of Java, and part of Sumatra, the Philippines and Japan, and all of the North Pacific to a little beyond the International Date Line; also the Bering Sea and northwest coast of Alaska.

The path of total eclipse will begin at sunrise between the Black and Caspian Seas. It will cross the Khirgiz Steppes; the lofty plateau of Tibet; diagonally across China to Hankow, Nanchang, and the Chinese coast; across the northern tip of Formosa, and about twenty-five miles to the north of the island of Guam, and over Japanese Mandated Islands of the Marianas and Marshall Groups where it ends at sunset. At Manila there will be a large partial eclipse of 72 per cent in the early afternoon. There will be many native tribes in Asia and the islands of the western part of the Pacific in whose hearts fear and superstition will be stirred by even the partial phases of this eclipse, as in the days of the Medes and the Persians, when, according to Herodotus, a battle was arrested and a peace pact later signed because of the blotting out of the sun in total eclipse.

There will be, this August, the usual periodic display of The Perseids, the meteoric swarm that is at its best on August 11-12. The planet Venus will be in the evening sky but not well placed for observation in August as it will be low in the west and will set about an hour after the sun. Its position will improve gradually during September.

Mercury will be too close to the sun to be seen until near the end of September, when it may possibly be glimpsed low in the west in the evening twilight for several days. Jupiter will rise more than five hours before the sun in August, and will be in quadrature with the sun on September 13, when it will be on the meridian at sunrise. Saturn is now some distance to the west of Jupiter, and in August rises an hour or more before midnight. It will be in quadrature with the sun on August 21. In September it will rise about nine o'clock in the evening. Autumn will commence on September 23 at 5:33 A. M., Eastern Time, when the sun will cross the equator going south.

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Six Pieces of Glass and an Elementary School Room

With this School Page, we begin a new school year. We find ourselves faced with deciding whether the page should consider recommendations for specific grades—as it did a few years ago—or whether it should handle problems of policy brought to a focus by professional educators, textbooks, courses of study, motion pictures, or other elements important in determining what goes on in a school room. It seems advisable that, in alternate issues, the page deal with practical suggestions for using the special Nature insert. For a time at least, the other numbers will be of a character similar to this article. We may suggest the school room possibilities of a few glass fruit jars, or the resources of some old shoe-boxes, and so on.

Given six pieces of glass, a little putty and adhesive tape, possibly a glass cutter, and you have the makings of excellent equipment for studying weather, capillarity, germination, minerals, light and a host of other things. You can use them to make a reflectoscope. You can demonstrate surface tension, refraction, reflection and insulation; and you can make a great variety of attractive mounts for seeds, leaves, twigs, insects, minerals and so on. You can improve your photography of Nature subjects, and certainly improve your teaching. Now let us get down to specific suggestions. Below is shown a picture of the second grade room of the Jefferson School of Delphos, Ohio, where Grace M. Hartshorn is teacher and principal and has an enthusiatic Nature class. Most of the suggestions below could well be used in a room of this sort. The teacher will have to do the glass-cutting, but otherwise elementary children can do practically everything else.

Let us assume at the start that all of the pieces of glass are the same size, possibly five inches by eight inches; that they are clean and unscratched.

To demonstrate capillarity, fasten two of the pieces of glass together with a rubber band. Separate them along one side with a match. Stand the two pieces of glass in a dish of water with the separated edges to one side and the edges in contact on the other. The liquid will rise between the two pieces of glass highest at the edges that touch, because of capillarity.

Remove the match and let the two pieces of glass come together through their entire surface, and with the water still between them. Try to pull these two pieces apart in the same way you would lift one dry piece of glass from another dry piece on which it rests. Because of the water, air cannot get between the two pieces of wet glass as it can with the dry pieces. About the only way the two wet pieces can be separated is to slide one off the other. What other examples can you find where a wet surface clings to another that is in contact with it? Why do you wet your finger when you wish to turn the page of a book quickly? Study of these two wet sheets of glass should help get the answer.

Soak a few pea or bean seeds overnight, or for a few days, until they have started to germinate. Draw a line on a blotter. Lay the blotter on a piece of glass. Lay the seeds on the blotter so that the growing root-tips just touch the line. Lay a second piece of glass on the seeds to form a glass "sandwich" with blotter and seeds between. Stand the "sandwich" so that the bottom of the blotter is in a dish of water and so that the line on the blotter is horizontal. Leave the apparatus for a day. Has the seedling continued to grow? How much growth does it make each day for a week? Here is a simple device for observing germination made from two of our pieces of glass.

Make a collection of the common rocks and minerals found outdoors. Test their hardness by seeing if all can be scratched easily with glass. Among the things that *cannot* be scratched with the glass are quartz, flint, garnet, olivine, feldspar and diamond. Most glass is said to have a hardness of from 4.5 to 6.5, so anything that it cannot scratch has a hardness greater than this, while anything it can scratch has a hardness less than this.

An excellent leaf mount may be made by laying a dried, pressed leaf between two sheets of glass and binding the edges with passe-partout. Such leaves may be handled repeatedly by classes without injury and each side may be examined without difficulty.

Winter twigs may be mounted by fastening them with narrow strips of gummed paper to a piece of glass. Narrow strips of cardboard should then be glued again and again around the edge of the glass until they "build up" to a thickness equal to that of the twig. Then a second piece of glass may be added and the whole bound together with passe-partout. Such mounts are useful to show differences in twigs of trees that are closely related. A mount of maple twigs might be useful as a starter. If slender sticks of wood such as are used in making kites are available, they may be used in preference to building up a thickness with the strips of card. I have used one of these mounts in classes for twenty years.

Butterflies and moths are often mounted on cotton in boxes, but this allows but one side to be seen. They are sometimes mounted in boxes but become easily infested with destructive pests. Our glass should help solve both of these problems. Dry the moth or butterfly on a spreading board so that it will be in the desired position. Lay it belly up in the center of one piece of glass. Cut two strips of glass of a size sufficient to hold the insect down everywhere except over the thick body. Build up the edges as before with sticks or cardboard so that a piece of glass the size of the first may be laid to cover all of the under side. Now bind the whole thing with passe-partout. The insect will fade if kept in too strong light, but in all probability it will otherwise outlast any other mount you may have of similar creatures, and since it may be handled freely will be much more useful.

If you have a rivet punch you may punch a thick card with holes. Then fasten the card firmly to a piece of glass of the same size with household cement. Fill the holes with good-sized weed seeds. Write the proper names on the card beneath the holes. Put another piece of glass on top of the card and the seeds and bind it firmly in place with gummed paper. If small seeds are used, they are likely to make their way down between the card and the glass and spoil the effectiveness of this mount. Some prefer to number the holes on one side and write the names of the seeds on the other side of the card. The numbered sides may be used when examinations are given and the named sides when the pupils are learning to know how corn differs from ragweed, sunflower or wheat.

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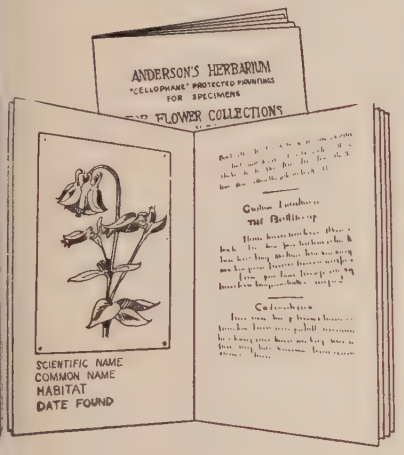

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of glass. With these we can make a box enclosed on all sides. We can see through this box from all angles and we can rather effectively shut off the air enclosed from the outside air.

The six pieces of glass may be fastened together to make a box with adhesive tape. If this is done carefully it will be sufficiently strong to last for a number of years and serve as a terrarium in which mosses, liverworts, salamanders and other creatures may live with reasonable comfort. The top of such a box might best be hinged to the other pieces with tape applied inside and out so that living things may be taken out and freed in their natural environment when they have served their purpose in the school room.

A little glass box like this may have the inside angles reinforced with a mixture of ten parts of putty to one of litharge and one of red lead, softened if necessary with linseed oil. When this mixture is hardened the box may be used as an aquarium. With the box enclosed, the humidity of the air inside can be controlled, and you can study little climates, heating it to get vapor into the air and then cooling it so that the vapor forms drops of water on the glass. The box may be inverted over growing plants to demonstrate that such plants give off moisture since the moisture will collect on the inside of the box.

If the cover of such a box is removed and fish put in the remaining aquarium the cover may be used to hold the fish relatively flat, or in one plane against the side, so that they may be photographed easily and be mostly in focus. Free fish move about too much to make this possible.

If rock specimens and other opaque objects are laid on top of this glass box, they cast no conspicuous definite shadow. They may then be photographed more satisfactorily than if they are placed on an opaque card or table.

And so we see our six pieces of glass can be really useful in an elementary school room both to the teacher and to the pupil if we only know how to use them to the best advantage.

Swedish Bird Banding

Starlings depart twice a year from Sweden; once in July, when the young birds fly to Denmark and Schleswig-Holstein in northern Germany, and once in October, when the full-grown birds leave the country to pass the winter in England. The mass move occurs in October, and there is a stop of two or three weeks in Belgium before moving on to the British Isles. The return of the birds to Sweden usually takes place in March in the southern sections and a month and one-half later in the north.

Bird migration has been studied by the Swedish Museum of Natural History over a period of years. Some data were gathered as early as 1880 by the Swedish Meteorological Service, which at that time believed that weather forecasts could be made on the basis of bird habits. In 1913 banding activities were started by the Museum. The first World War interrupted this, but work was resumed and is still being carried on despite the present situation in Europe. An immense amount of migration data covering some twenty-five bird species have been acquired and catalogued.

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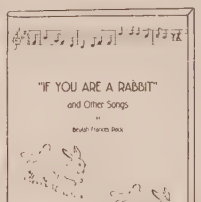

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WILDLIFE CONSERVATION—1941 BRAND

(Continued from page 395)

finely-illustrated articles has been facilitated. In this way greatly exaggerated increases in both waterfowl and upland game have been credited to the work of More Game Birds. Its influence has also been exerted on both state and national conservation agencies. This organization is now terminated, but its influence seems to have been transferred to other hands, and, like other evils, to be living after it.

The table below does not, of course, include the number of illegal hunters, those hunting without license on their own property, boys under 16, and the men in service being granted special privileges by some states in response to a misguided campaign by *Outdoor Life*.

Ducks Unlimited

This is an agency started and sponsored by More Game Birds in America. Large sums

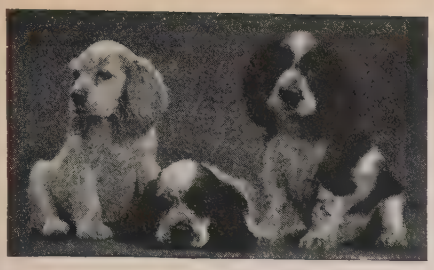
(Continued on page 406)

Hunters' Licenses Issued by States

Mig. Bird Stamps

	1911	1922	1925	1927	1930	1936	1939	1935-6	1939-40
Ala.	5,090	21,775	52,120	87,044	85,017	88,539	113,826	1,403	5,833
Alaska		20	137	268	214	9,821	10,658	2,380	2,761
Ariz.		18,134	30,126	38,765	30,125	23,696	34,070	1,760	3,555
Ark.		6,261	4,189	101,500	84,830	44,341	54,532	9,134	14,401
Calif.	138,659	222,791	231,329	228,696	231,970	224,050	270,695	33,297	74,644
Colo.	41,058	79,405	97,588	107,725	111,211	96,541	159,441	6,695	22,663
Conn.	19,635	32,594	35,087	37,924	29,052	27,227	35,103	2,116	4,904
Del.		218	2,499	2,314	2,355	12,736	15,233	1,259	3,164
D. C.								928	3,421
Fla.		16,981	57,422	60,021	53,778	52,289	57,072	4,431	13,009
Ga.	13,224	15,317	66,052	79,803	47,168	74,622	178,920	730	2,569
Hawaii								97	59
Idaho	50,342	61,872	66,838	76,082	86,510	84,764	104,742	6,610	19,064
Ill.	192,244	298,500	297,490	305,067	342,546	309,743	324,243	36,337	66,434
Ind.	54,831	164,005	197,433	310,721	318,949	387,688	358,386	5,379	18,686
Iowa	91,000	113,996	156,166	165,010	227,731	125,662	183,100	18,910	39,143
Kans.	44,069	74,367	115,028	115,257	143,632	76,965	84,703	17,353	18,536
Ky.		75,251	89,112	108,281	106,546	85,161	95,967	1,291	4,564
La.	76,000	104,550	91,654	104,653	108,158	69,696	96,379	10,242	33,870
Maine	2,552	20,706	39,558	43,523	83,598	103,279	98,039	3,214	8,349
Md.		70,285	67,920	70,866	73,555	52,251	77,049	2,831	8,993
Mass.	45,039	82,094	108,810	110,496	114,407	74,419	85,834	6,033	15,048
Mich.	22,323	253,526	290,280	365,273	303,311	577,579	711,733	14,796	86,064
Minn.		135,466	172,310	118,235	206,340	285,429	246,857	44,067	120,034
Miss.						102,838	117,488	3,154	7,591
Mo.	66,662	102,503	239,820	231,890	231,435	161,862	194,880	14,080	26,961
Mont.	59,291	55,683	71,454	75,324	83,600	104,522	132,420	10,474	24,836
Nebr.	39,402	110,242	139,734	163,580	187,672	144,935	129,915	17,818	26,588
Nev.		4,533	5,350	5,478	7,276	7,189	10,457	2,272	5,608
N. H.	33,542	59,874	54,200	57,720	56,091	56,022	54,046	829	2,727
N. J.	61,920	134,729	155,567	185,221	196,971	119,055	129,238	6,640	16,936
N. Mex.	7,000	9,689	15,472	17,415	19,884	20,877	28,257	1,681	4,187
N. Y.	150,222	228,873	339,147	675,780	706,417	579,525	591,946	11,917	32,304
N. C.				145,268	125,509	117,705	153,565	1,995	8,564
N. Dak.		31,886	36,161	35,271	33,706	24,723	41,109	6,581	15,148
Ohio		312,879	361,098	368,485	446,427	476,487	521,963	7,001	20,680
Okla.		76,345	92,175	153,332	128,729	86,284	111,098	8,824	19,740
Oreg.		47,494	54,068	58,186	64,923	78,614	111,706	9,709	26,774
Pa.		475,861	525,045	517,729	509,926	541,954	661,330	5,088	16,008
R. I.	6,541	17,106	10,913	10,285	9,766	8,369	8,997	1,074	2,641
S. C.		76,389	76,834	112,364	101,119	81,185	94,744	1,944	3,634
S. Dak.	51,054	46,282	85,382	104,188	110,141	66,552	75,775	9,461	21,849
Tenn.		12,698	44,307	63,306		52,951	84,650	5,024	8,615
Texas	22,096	32,473	72,070	105,191	113,525	84,456	123,925	28,150	63,460
Utah	27,800	78,000	52,352	40,932	48,489	54,826	74,713	3,672	14,520
Vt.	31,762	36,969	39,496	38,266	40,878	47,828	45,084	1,116	2,851
Va.	138,452	98,276	93,488	118,698	151,483	122,938	164,095	1,792	6,767
Wash.	40,000	157,189	185,150	202,075	211,549	181,094	215,712	18,980	50,796
W. Va.		75,435	123,656	142,151	146,104	179,756	151,994	396	1,037
Wis.	100,000	179,296	164,844	173,129	205,169	244,820	294,100	35,154	84,075
Wyo.	9,721	17,877	25,494	25,467	23,009	24,373	27,013	2,660	6,896
Total	1,640,561[a]	4,341,098	5,332,375	6,462,555	6,960,934	6,658,158	7,646,193	448,204	1,111,561

a. Figures not available from 21 states; some did not then issue licenses. Total of persons hunting in 1911 therefore probably twice this number



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HERBS IN A WARRING WORLD

(Continued from page 398)

home-grown, fragrant leaves, but also distill from their own flowers the choicest scents of the garden.

The Shakers were among the first to grow medicinal herbs in this country for profit. Primitive peoples in all lands still use herb medicine, poisons and love potions. A colored cook from Jamaica recently and seriously assured me that she had cured a girl in advanced stages of consumption, by persuading her to take herb medicine instead of that prescribed by a white doctor. Among the plants used in the preparation of the cough syrup she concocted were wild orange, turnips, carrots, and the leaves of a number of native plants that she said "I wouldn't know about".

A number of enterprising women and a few men have engaged in the business of preparing herbs or herb products for the retail food market. These are either dried carefully and packed in jars to be used for seasoning or fragrance, or else are incorporated in processed foods such as tarragon vinegar, spiced jellies, and other delicacies that command fancy prices. Herb farms and gardens are springing up in many sections, especially in the East and near the large cities, where the "carriage trade" is willing to pay the price. There are also a number of nurseries where the plants are grown for sale. Seeds usually come through regular commercial channels, as small establishments are not equipped to handle seed production very satisfactorily.

The culture of most herbs is extremely simple and easy. They must have a well-drained soil, not too rich, and a bit on the sandy side. They like sun and they are better when not crowded. Sweet basil and some of the other leafy herbs will stand feeding, but the majority do better when not overstimulated and left to their own thirsty devices. Overfeeding coarsens the plants and the flavors or scents are not so desirable. Most of them are fairly easy to grow from seed, although such things as mints and chives are easier to start from plants. If you do start an herb patch, you will never again be without at least a few of them.

Photographic Judges

A distinguished board of judges has been selected by the Photographic Society of America to consider the pictures submitted in the First Annual Nature Salon of the Society. Entries will be judged on October 5 and the successful pictures will be exhibited in the Museum of Science and Industry in Chicago from October 24 to November 22. After this the prints will be shown in Philadelphia, New York and Washington. Further information may be obtained from Russell Gray, 1530 Locust Street, Philadelphia.

Correspond

John Sanjean of Lydia, Maryland, would like to correspond and exchange specimens with others interested in beetles, butterflies and moths. He is particularly a beetle enthusiast.

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WILDLIFE CONSERVATION—1941 BRAND

(Continued from page 404)

have been contributed by sportsmen and others for work in the Canadian nesting grounds by Ducks Unlimited (Canada). We believe that the officers of this latter agency are honestly trying to improve conditions there. However, the mere fact that their activities are necessarily restricted to a relatively small part of the vast northern breeding grounds, now only imperfectly utilized by our depleted waterfowl population, tends to limit the effect of their endeavors. Any good work done is further lessened in effect by the distorted articles that continue to be published in American magazines and other periodicals through the influence of the sponsoring organizations. There is evidence also of direct opposition having been waged on conservation projects and movements in the United States. These evidences of bad faith on the part of both organizations have cast a cloud over the whole movement that will not easily be dispelled.

Wildlife Institute

The Wildlife Institute was organized in New York City on August 14, 1934. Its first president was Thomas H. Beck of the Crowell Publishing Company, and most of its officers were hunters, publishers, or representatives of arms, ammunition and fishing-tackle interests. According to statements ascribed to Mr. Beck at the time, the objectives of the Institute are to seek a membership of ten million, to raise money, complete surveys, promote legislation, and supply "political pressure for the enactment of laws to advance the movement of wildlife restoration."

"Conservation has not been effective," Mr. Beck is quoted as saying. "What we need is restoration. Formerly one could hunt and fish 365 days in the year, now it is limited to thirty or sixty days. The time limit has been decreasing, and the bag has been getting smaller and smaller. But so have the birds and mammals. Conservation isn't enough."

Looking back on these and other utterances, it now seems clear that by "restoration" the advocates of the new order had no thought of ever trying to restore our native game species to larger numbers, but rather to keep on shooting these as long as they lasted, and then to substitute for them other species from foreign countries.

Wildlife Federation

The Wildlife Federation was formed in Washington, D. C., on the occasion of the meeting of the North American Wildlife Conference Feb. 3-7, 1936. Its goal, as expressed in the preamble to its constitution, is as follows:

"Believing that the natural resources of the continent are economic, social, recreational and esthetic assets which should be restored and perpetuated for our posterity, and realizing that this can be achieved only through an enroused and enlightened opinion among the people of this nation, we dedicate this Federation to these ends."

Under its constitution the Federation divides the country into thirteen regions, each to have one member on the General Board of Directors. Other delegates at large were to be selected. County Federations were envisaged for each county, and these were to draw together the civic clubs, sportsmen's groups, Chambers of Commerce, Boy Scouts, Girl Scouts, schools, bird clubs, Future Farmers of America, 4-H Clubs, garden clubs, and farm groups.

It is difficult to imagine a more worthy and efficient method to conserve our wildlife, if its purposes had been honestly carried out. But it soon became apparent that the organized gunners had no intention of taking chances on welcoming to their councils any such "sentimentalists", "sob-sisters" or "gun-silencers", as the non-shooters are called. In several states only delegates representing organized gunning groups have been welcomed, or even tolerated at their meetings. Under such conditions, it is difficult to see how any reforms beneficial to wildlife can result, however well-meaning are the leaders. If the full power of the various groups named in the original constitution could be enlisted, however, the Federation might yet become a much-needed power for real conservation. It should not be forgotten that the Federation advertised affiliation with this comprehensive list in its original bid for support.

Mexican Treaty

The Convention between the United States of America and the United Mexican States for the protection of migratory birds and game animals was proclaimed March 15, 1937. Although it was originally patterned after the U. S.-Canadian Treaty, the final draft leaves much to be desired. For example, it extends the period of hunting to four instead of the three and one half months of the Canadian treaty. Under this provision the shooting season now extends to March 10. This, of course, means spring shooting, and the treaty extends to citizens of both Mexico and the United States a privilege they are properly denied in the United States and Canada. Needless to say, many from our southwestern states avail themselves of this destructive practice, in which Mexican officials offer every facility.

It is all too plainly evident that the satisfying of commerce and industry was among the ends desired and obtained by Mexico. There is also some danger that attempts to make the period of hunting in the United States conform to the longer period granted in Mexico may be brought forward by enemies of conservation.

Less Game—More Hunters

In view of the grave dangers that still threaten our wildlife, is it not time that our law makers, Federal and State, realized that it is folly to continue to assume that our diminishing stocks of game birds can still furnish sport for the increasing hordes of gunners that each year take the field; or that the vast arms and ammunition interests and the other industries that they foster can continue to reap the millions that now annually change hands, while our wildlife dwindles? We are weary with listening to the twaddle that is poured out in newspaper releases, over the radio, and in the reports of both Federal and state agencies. Most of it is written by persons either ignorant or indifferent to the true conditions, or by those inspired by selfishness or greed.

NATURE IN PRINT

(Continued from page 363)

through them the truth about the deep sources of the actions of animals, including (as I believe) ourselves.

The more we understand these secrets of mind—the more widely we extend our knowledge of our own world through such works as the Cruikshanks'—the more we know of the past that is so delightfully pictured for us by Willy Ley, the better suited we are then, of course, to live and enjoy our own lives. There is thus more than summertime reading in these wildlife books, more than the interest in the excellent and appropriate illustrations that are in each, for each of them seems to cast some light on the workings out of our own salvation, which has seemed to me to depend in part on the perpetuation of the wildlife about us. The implications of Mr. Ley's work in this connection are especially interesting. Speaking of all the forms of life that are now as "dead as the dodo," he says:

"The law that actually does apply to all these may be stated as follows: a species that is too strictly adapted to a given set of conditions is bound to face extinction, if, as, and when these conditions change. . . . These explanations are not intended as an apology for the havoc wrought by man in the past, usually without his knowing what he did. They are intended to show that these cases have no other significance than that the species in question no longer fitted into the fine balance that Nature always tries to maintain."

It is possible, perhaps, to read into them a further significance, however, in at least two regards. For one thing, it would seem to me that Mr. Ley's conclusion should lead us human beings to be everlastingly cautious about the manner in which we permit ourselves to change the conditions of living that so far have been so favorable to us, conditions that for one thing have included an abundance of wild creatures. A more practical or immediate application, along lines now being followed to some extent, would be through efforts to preserve not only our wild animals themselves, but with them and for them the surroundings and conditions upon which they depend. Mrs. Cruikshank's writings show that she is well aware of this necessity, and the conservation work of the Audubon Society to which her writings relate is also of this nature. We can hope that such efforts will increase, if to no other end, at least that they may postpone extinction. When it comes to matters of extinction and the importation of new forms of life to replace our own, I believe that we are all conservative rather than adventurous, at least in summer. And, who knows, perhaps by taking thought we can after all add a few eons at least to our existence and that of our fellow creatures.

Cornell Leaflet

Outdoor Living is the title given to the March, 1941, issue of the Cornell Rural School Leaflet, and into it E. Laurence Palmer has packed an amazing amount of practical information on how to take care of oneself in the outdoors. It seems to us that this leaflet should somehow be made available for wider distribution than is now possible.

Edward Bausch . . . . . Microscope Maker

WHILE Pasteur and his contemporaries were fighting the combined forces of superstition and disease [to] lay the foundations for modern bac[teri]ology, another young man was de[signing] a microscope that would help [im]measurably in spreading the benefits [of] science to all mankind.

While Pasteur was proving that heat would destroy the organisms that [were] making French wines turn bitter, [and] perfecting the pasteurizing process [that] makes his name immortal, in America, Edward Bausch was computing his own objectives, grinding his lenses and fitting the parts for the first Bausch & Lomb Microscope.

While Pasteur was proving his procedure for the cure of rabies by saving the life of the little Alsatian peasant, Joseph Meister, Edward Bausch was working day and night to demonstrate his belief that quality microscopes could be made in quantities and at such prices as to bring them within the reach of all students and research workers.

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TO THE EDITOR

About Nature Music

Dear Sir:

Please, please do not take up valuable space in the magazine with songs for children. After all, the magazine is written for adults, and no doubt most people, like myself, read it for its accurate information on Nature subjects and for the great pleasure we derive from it.

EDITH JOHNSON

Springfield, Mo.

Dear Sir:

Shall we have more music in Nature Magazine? Music has been a part of the elementary school for a very long time, but elementary science is just clamoring for a permanent place. The present program is of two types, the one in which science is a regular subject, the other in which science is an integrated part of the curriculum; so don't you see how helpful these little Nature songs will be. If we can tell the elementary teacher that in Nature Magazine is to be found both music and science, then you will be serving the teachers in a threefold capacity, (1) as you serve me with general information and pleasure in our biology classes, (2) the school page edited by that splendid gentleman, Dr. E. Laurence Palmer, and (3) with anticipated music and song, not only for the elementary teacher but all of us.

GRETA OPPE

Galveston, Texas.

Dear Sir:

I am delighted to find a song in the June issue of Nature Magazine. We shall teach it to the children. Such a song develops the right feeling toward one of God's living creatures. If children had more training along this line, perhaps, as adults, they would never wantonly kill defenseless creatures. I shall be glad to see this new feature continued long enough to give it a fair trial.

MATHILDE WEIDEMANN

Detroit, Mich.

Take a Bow, Laurence

Dear Sir:

Of course, I always enjoy reading Nature Magazine from cover to cover (ads included) and appreciate all your endeavors in so many directions and in particular toward conservation of our national forests, wildlife, etc., but I realized the other day how seldom, if ever, I take the time to express this appreciation.

At the same time I want to tell you that I have never read a more fascinating contribution than Dr. E. Laurence Palmer's "Weed Patches and Waste Places"; it displaced all thought of war, national defense and kindred thoughts! The humor of it is delightful. I have not had such a thoroughly good time in months, and really every time I look at a lot full of weeds (and there are plenty of them even along Fifth Avenue) I recognize individual weeds as personal friends of Dr. Palmer. I have always loved them myself.

The family aspect of the article recalled to my memory the daily, or nearly so, upset over my father's remark the minute mother's hot dinner was in his stomach and he seemed to regain new energy—"Well, Johnnie, I think the next job will be to cut down the two big cedars; they ruin any orchard and would provide us with a lot of fine fence posts." Both, I am sure, were glad to escape to the orchard to escape the wrath of five women. The cedars still stand.

MYRTLE E. ROWLANDS

New York City.

Helps in School

Dear Sir:

I wish I could express to you how much help Nature Magazine is to me. A short time ago a teacher in a small church school asked me to come to her school each week for a number of weeks to teach the Nature class. I accepted, knowing I would have to arrange my own outline. . . . I am not an artist but an artist friend made me a beautiful picture on cardboard, thirty by forty, showing desert, sky, rocks and sandhills. She left out all living things, these to be put in from pictures from Nature Magazine. As each tree, bird, lizard and other thing was placed something was learned of its life. The children enjoyed it so much that they requested to stay in at recess time. This same plan could be used variously.

LOIS WARD

Palo Alto, California

Too Pessimistic

Dear Sir:

Sentiments expressed in the editorial in the April Nature Magazine and in the letter referring to this editorial appearing on page 352 of the June-July number, seem to me unduly pessimistic. Those of us who are sentimentalists regret that all killing has not stopped. Those who are impatient feel disappointment that public education is a slow process. But there are many reasons for encouragement and conservationists should adopt an attitude of confidence.

Here in Missouri popular vote on Amendment No. Four to the State Constitution in 1931 showed the great majority favoring methods of true conservation. This has since been reaffirmed at the polls. Most encouraging is the progress of nature study and conservation work among youth groups, particularly the 4H Clubs. An entirely new youth group for conservation, the Missouri Nature Knights, has been founded and already has a membership of more than 60,000 rural school children. History will record this as the finest single contribution to conservation work. Nature study is being given more and more attention in the lower grades of public schools and a great volume of conservation education is being carried on.

Civic organizations are giving more attention to conservation. One of the foremost of these is the Federated Garden Clubs, a most active and efficient group which has given conservation a definite and prominent part in their program. There are other statewide groups whose sole work is conservation and while some of them may tend to the sportsman's viewpoint there is definitely a trend toward true conservation.

We shall not save all the forms of life that we now have. But the history of evolution through past ages is dotted with extinct species. What we, as conservationists and naturalists, are striving for is a sympathetic understanding of relationships of different forms of life to the earth on which we all live, and a fair-minded attitude toward all of them.

It is true that in time of national emergency we might quickly lose some of our gains, but it is also true that under proper guidance we might as quickly gain more advanced objectives.

G. E. MOORE

Sullivan, Missouri

It is difficult, and perhaps impossible, to evaluate the relative strength of constructive activities in conservation in proportion to destructive activities that often parade under the banner of conservation. There is no question, of course, that appreciation of the importance of our natural resources has grown rapidly and recently. At the same time destructive forces have grown in numbers and strength, as for example, in the case of the doubling in numbers of the hunters of migratory waterfowl in a five-year period. As a consequence, a little realistic pessimism is not out of place, if only as an incentive to further efforts. EDITOR.

Dr. Oberholser Retires

After 46 years of service with the United States Biological Survey, and its successor, the Fish and Wildlife Service, Dr. Harry C. Oberholser, internationally-known ornithologist, has retired. Happily, he will continue his work in this field as Curator of Ornithology at the Cleveland Museum of Natural History. Author of many technical and popular publications on birds, member of many scientific societies, his contribution to ornithology has been a distinguished one. Dr. Oberholser has been a member of the Scientific Consulting Board of Nature Magazine for many years and will continue in that capacity. We congratulate the Cleveland Museum on obtaining his services.

Beekeeping for Fun

Beekeeping as A Hobby. By Kyle Onstott. New York. Harper and Brothers. 1941. 137 pages. $2.00

In this book the author finds a middle road by providing material that is not too advanced for the layman who would like to keep bees and reap a harvest from them, and yet not too simplified for the established beekeeper. Mr. Onstott tells the ways of beekeeping in such interesting fashion that the reader is immediately tempted to undertake the hobby. We suspect that is what his publishers hoped.

Biology Text

Life Science—A Biology. By Ralph C. Benedict, Warren W. Knox and George K. Stone. New York. Macmillan. 1941. 682 pages. Illustrated. Index. $2.00.

This is a foundation text in biology for high school work. The text is prepared to provide students with information leading to advanced study in biology; to inform them so that biological matter in books and periodicals may be more meaningful; to aid in the cultivation of careful habits of observation and of systematic thinking; to interrelate biology with social welfare.

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Forgotten Gospel

The Forgotten Gospel. By Cephas Guillet. Dobbs Ferry, New York. The Clermont Press. 1940. 395 pages. $2.50.

The author of this book, which is controversial and stimulating, is distantly related to Henry D. Thoreau, the sage and philosopher of Walden. He has in common with Thoreau a love of Nature, an independence of mind and the approach of the philosopher. For the illustration and clarification of the ideas set forth in this volume Dr. Guillet draws heavily upon Nature. He thinks that the perfection of character demanded by Jesus of his followers may be compared to the perfection of the tree, which is a progressive, growing thing. The leaf and the flower and the whole plant are not born in a mature state of perfection. They grow from seed and bud and shoot into an ever more mature and complete perfection. But each stage has a beauty and a perfection all its own. Such is the perfection of a man who has been "born again," as Jesus put it. Such people, Jesus thought, could form that perfect society that it was his peculiar mission to advocate. But, Dr. Guillet says, Paul came along, and, not understanding Jesus, taught a very different gospel; a gospel revolving around the person of Jesus rather than his message; a gospel of the Cross, which prepares for death and the heavenly kingdom, instead of Jesus's gospel of the Kingdom, which prepares for life in a perfect Society here on earth, which was to take the place of our selfish, national, warring states or "kingdoms of this world." This is the main thesis of Dr. Guillet's book. Incidentally he examines the various ideologies competing today for our support—communism, socialism, fascism, naziism, democracy, and contrasts them with the good society that Jesus, the supreme politician, outlined and strove to recommend to mankind—thus far in vain.

For Hiking Enjoyment

Ten Easy Lessons in Hiking Fun is the title that Harry P. Mount gives to a little booklet designed to aid hikers to learn more about what they pass on their hikes. His chapters cover Nature games for hikes, studies in trees, an outline for bird study, edible plants in the woods, the zoological hike, the camera hike, an astronomy hike and other original hiking ideas. This is a little 32-page booklet chiefly valuable for its concise suggestions and practical advice. It is published privately by the author at 224 East Main St., Kent, Ohio, and sells for fifty cents.

Insect Control

More than fifty species of insects attack garden crops in Illinois, being pests to the commercial and home gardeners. Their depredations may be controlled through proper use of insecticides and through crop management and good cultural practices. To educate the grower and to aid him in control, the College of Agriculture of the University of Illinois, in cooperation with the Illinois Natural History Survey, has published a 54-page illustrated booklet entitled *Insect Control for Garden Crops.* It is the work of L. H. Shropshire, field entomologist, and is Circular 514, and is available free from the University at Urbana, Illinois.

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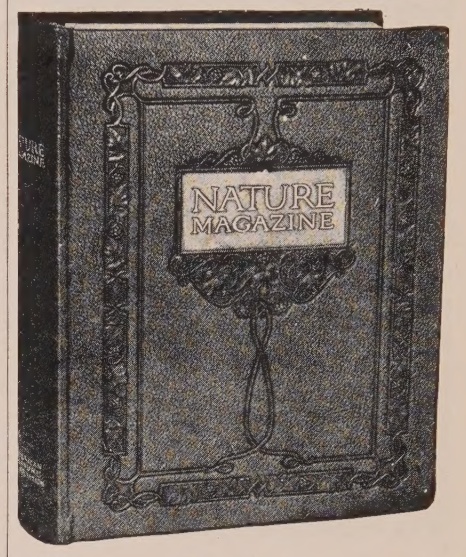

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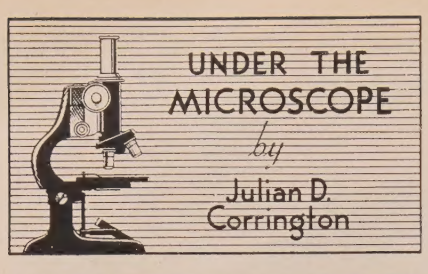

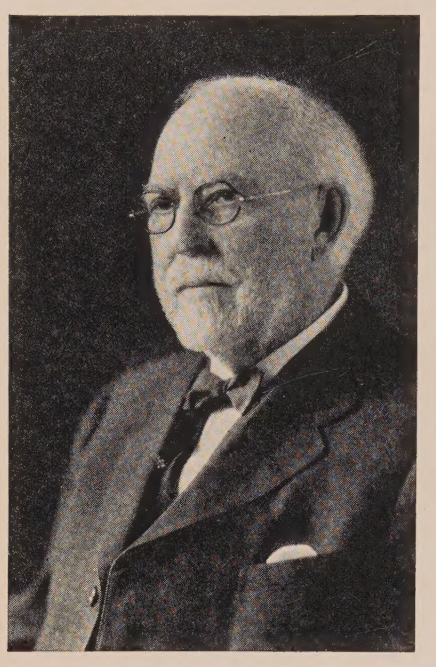

DR. SIMON HENRY GAGE

Dr. Gage Celebrates Ninetieth Birthday

On the evening of May 20, 1941, approximately 150 friends, colleagues, and former students of Professor Simon Henry Gage assembled at a dinner in his honor at Willard Straight Hall, Cornell University. The occasion was one of those rare and remarkable events—the ninetieth birthday of an eminent scientist who, still hale and hearty at this advanced age, works daily in his laboratory in Stimson Hall.

Known the world over as the dean of American microscopists, Dr. Gage has this summer read proof on the seventeenth edition of his famous book, *The Microscope,* soon to be released by the Comstock Publishing Company, of Ithaca, New York, of which Dr. Gage has been president since 1932.

Master of ceremonies at the banquet was Professor Benjamin Freeman Kingsbury, Dr. Gage's successor as head of the Department of Histology and Embryology at Cornell, of which Dr. Gage is Professor Emeritus. After Dr. Kingsbury's opening remarks, Professor Grant S. Hopkins, Veterinary Anatomy, Emeritus, read extracts from numerous letters and telegrams received from all over the United States. Among these was one from the 925 members of our own American Society of Amateur Microscopists, of which Dr. Gage is president.

Professor James G. Needham, Entomology, Emeritus, celebrated author and teacher whose works have been reviewed frequently in these columns, spoke of Dr. Gage as a teacher; Dean George H. Sabine of the Graduate School, representing the University Administration, recounted Dr. Gage's research and described its value; Professor Ernest Merritt, Physics, Emeritus, told of the honor guest's contributions to the science of physics.

Dr. Gage, in replying, spoke of the ideals and principles of the University, especially of its democracy from the beginning, and modestly remarked that this occasion should be credited to the establishment of the new Fellowship, a gift from his many friends and former students. He said, in part:

"I am proudly thankful that I could spend my mature life in this University atmosphere with its high thinking and noble living; that I could see daily the magnificent view spread out before us, and the glorious sunsets; most of all that I have had the sacred opportunity of influencing aspiring young people and helping them start on the road of higher living and greater service.

"I take it that no normal human being could be indifferent to the friendliness shown by the messages and this meeting to celebrate the completion of the Fellowship fund and incidentally my ninetieth birthday.

"To me the supreme satisfaction comes when I think of the endless series of young graduates who will by means of this Fellowship have the chance of larger opportunities in research which will enable them to reach heights that would be impossible otherwise.

"From the bottom of my heart I thank you who are present and the unnumbered friends not present."

The dinner marked the establishment of the Simon Henry Gage Fellowship in Animal Biology, founded since his sixty-fifth birthday by 252 of his friends. The fund thus provided carries an annual $500 Fellowship, to which the University Trustees have added free tuition. First recipient was announced by Dean Sabine as Sarah E. Foresman, of Williamsport, Pa., who received her A.B. at Wilson College in 1935 and her M.S. at the University of Pennsylvania, in 1936. Now in her second year at the Graduate School of Cornell, working in the Department of Histology and Embryology, she will begin her tenure of the new Fellowship this fall.

Professor Gage has been connected with Cornell since 1873 and has written extensively in anatomy, microscopy and optics.

New Bausch Museum

The cornerstone of the new Edward Bausch Hall of Science and History, the gift of Edward and Matilda Bausch to the Rochester Museum of Arts and Sciences, was laid recently with ceremonies at which Dr. Robert A. Millikan, famed physicist and head of the California Institute of Technology, was the principal speaker.

Inserted in the cornerstone was a copper box containing a variety of documents and objects that may interest archæologists and historians of the future. Among these were photographs of the donors; correspondence between Dr. Bausch, city officials and members of the Museum Commission; blueprints of the building; maps of Rochester; a roster of men who worked on the building; commemorative medals; a collection of modern postage stamps, old and new coins. In the latter collection was a Jefferson nickel, contributed by John Putnam, for thirty years a chauffeur for Mrs. Bausch.

Dr. Millikan, whose grandfather and mother were born in Rochester, said that "in the history of any institution, the word 'progress' is dependent upon two things—means two things. It means the passing on of the accumulated knowledge of the past and adding something to it as we transmit it from generation to generation, so that, in the long sweep of time, every institution that is concerned with the history of progress must have that history represented in libraries and museums."

Illustrating his conviction that modern science must be coupled with history for an understanding of our civilization, he referred to the California Institute of Technology which requires "not only four years of work in science and its application, but four years of history in its broadest sense, the broad sense being what we call the humanities."

Describing himself as "one who has been for more than 20 years a friend and admirer of Edward Bausch," Dr. Millikan expressed his pleasure at having a part in laying the cornerstone of the new building which is to contain written history supplemented by the instruments and devices which have helped to make it.

The new building of severely classic design is of buff Indiana limestone with entrance steps and platform of pink Minnesota granite. It is expected to be finished and occupied late in 1941 and will supply an urgent need of the city in the fields of education, research, adult recreation and youth training.

Historical Outline

At first glance it might seem that the subject of the rise of scientific societies was a bit far off from our general discourse on the history of microscopes, but the two topics became interwoven through the work of the pioneers who used the first crude microscopes in exploring the world no man before them had ever seen. Lens grinders made microscopes, research men employed the new instruments in epoch-making discoveries, and the societies published their results, making such findings available as knowledge for all educated persons.

Prior to the Renaissance in Europe scientists were few and far between, but with the dawn of the new learning, when men threw off the shackles of antiquity and began once more to investigate and to think for themselves, there arose many scientific men of note. There were great mediæval universities. Printing from movable type had been invented and books could now be turned out cheaply. Vesalius had written a radically new human anatomy and Copernicus an astronomy, both appearing in the same year, 1543, and both upsetting previously-held notions and serving to stimulate original thought.

Occasional and chance meetings of independent spirits in university centers or the larger cities developed into societies where the many new discoveries were eagerly discussed, controversial issues debated then as now, and, after a while, regular publications begun of the findings of members and even of outsiders. To such groups we owe the major share of our immense and invaluable heritage of scientific literature.

The first such body of which we have record appeared in Italy, then dominant in science as well as other spheres of learning. In 1560 della Porta, author of a number of works on natural science, including optics, organized a group in Naples under the designation of

cademia Secretorum Naturæ, or Academy the Secrets of Nature, the prerequisite for embership in which was to have made some scovery in natural science. Unfortunately, e founder came under suspicion by the hurch of practicing black art and was ordered to disband his society.

In 1603 della Porta launched at Rome the *cademia dei Lincei,* the Academy of the ynx, or, as Locy translated it, the Academy the Lynx-eyed Associates. Galileo was a ominent member. Again there was opposion from the Church and the Academy was vice closed, but finally restored in 1870 d still flourishes, the oldest scientific soety in existence, publishing handsomely inted *Transactions.* Pupils of Galileo estabshed the *Academia del Cimento*—Academy Experiments—in Florence in 1657.

The greatest of all scientific bodies, however, was to appear shortly in England. Divers worthy persons, inquisitive into natral philosophy and other parts of human arning, and particularly of what hath been lled the *New Philosophy* or *Experimental hilosophy*" held weekly and secret meetings London as early as 1645, and were styled e "Invisible College." Some of these people, sident in Oxford about 1648, formed an sociation there known as the Philosophical ciety of Oxford, and met, as a rule, in the oms of Dr. Wilkins, Warden of Wadham llege. They maintained close intercomunication with the London group. Ultimate- all activity concentrated in the London eetings, held principally at Gresham Colge. Sir Christopher Wren, the famous chitect, Robert Boyle, "father of chemistry," r. Wilkins, Ward, Goddard, noted physin, and Hartlieb were among the organizers. This group became the Royal Society of ndon for Improving Natural Knowledge, iversally known as the Royal Society, and ually considered as founded in 1660. After e Restoration, Charles II became a member d granted a charter (1662), meetings being held openly. Very soon this flourishing anization began to take in foreign mem- and award their F. R. S.—Fellow of the al Society—the highest distinction from day to ours for British men of science.

The first issue of their celebrated *Philoophical Transactions* appeared in 1664-5 and sisted of 16 quarto pages. In 1887 the lume of published matter had grown so ge that it was divided into Series A, thematics and physics, and B, biological.

1832 the Society began issuing abstracts papers, which developed into the *Proceedgs.*

Nearly all of the famous men of the early iod were members and contributors. Rob- Hooke was first to hold the title "Curator Experiments." Newton was made a mem- in 1671 and became president in 1703, lding the office for 24 years.

In the *Transactions,* often occupying sepae numbers because of their length, were blished the renowned letters of Leeuwenek, the great monographs of Malpighi on anatomy of the silkworm, the anatomy plants, and the development of the chick, ew's *Anatomy of Plants* (1682), Hooke's *crographia* (1665), Newton's *Principia* 687) and many other celebrated pioneer atises.

Similar organizations quickly sprang up other countries. The French *Académie des ences* was founded in Paris in 1665, and German *Akademie der Wissenschaften* cademy of Sciences) in Berlin in 1700. Others followed in all large cities throughout Europe. The National Academy of Sciences, American equivalent of the Royal Society, was incorporated by act of Congress in 1863, while the oldest U. S. group of this nature is the American Philosophical Society, founded by Benjamin Franklin in Philadelphia in 1743.

In 1831 Sir David Brewster introduced a new principle in scientific societies when he organized the British Association for the Advancement of Science (B.A.A.S.), a democratic, open-to-anyone institution. This idea caught on even more emphatically in America, where the American Association for the Advancement of Science (A.A.A.S.) was begun in 1848 and now has more than 20,000 members organized into 15 sections and including a host of affiliated societies, dealing with specialties such as anatomy, parasitology or microscopy. All of the groups issue publications, affording an outlet for the mass of scientific literature by means of which progress in the many and complex fields of modern science is made known to all.

Advanced Hints

Mallory's Triple Connective Tissue Stain

This famous technique, referred to in our discussion of amphioxus, furnishes some of the most beautiful of all microscopical preparations. Somewhat complex and difficult, it is not advised for beginners or those who have not yet mastered such a routine double staining combination as hematoxylin and eosin.

There are two solutions, known as Mallory I and Mallory II, which are not mixed. I is a 0.2% aqueous solution of acid fuchsin; i.e., dissolve 0.2 gram of dry crystals of acid fuchsin in 100 c.c. distilled water. II consists of 0.5 g. water soluble anilin blue, 2 g. orange G, and 100 c.c. of a 1% solution of phosphomolybdic acid in distilled water. To prepare II, first dissolve the acid in the water by means of stirring, without heat, then add the two dyes and stir again until solution of all components is complete.

Objects or sections for use with this stain are preferably fixed in Zenker's fluid, although Bouin's will also yield excellent results. Entire specimens are fixed and washed, heeding the need for treatment with iodine solution if Zenker's is the fixer employed, then brought back to water. Sections are first treated to dissolve the imbedding medium—paraffin or celloidin—then hydrated to water in the usual manner.

In either case, starting from water, the material is first stained in Mallory I, the time varying all the way from 30 seconds for very thin sections of delicate or transparent structure, to 15 minutes for an object as large and dense as an entire amphioxus. No set rule can be given and several trials will have to be made to determine the correct time. The same statement holds for staining in solution II as well.

Without washing, the material is transferred directly to Mallory II, for some 15 to 20 minutes. Then dehydrate and wash in at least two changes of 90% alcohol. Leave some 30 seconds in the first such wash, and for a variable time in the second, which is used to differentiate. The alcohol will decolorize the blue, which should be extracted until of a light yet strong hue. Some workers prefer to use a third bath of the alcohol for this purpose. Then pass material rapidly

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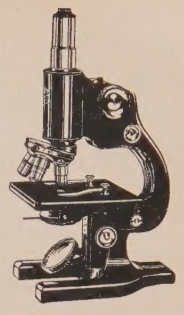

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EARTHBOUND

IS THERE a strange, ethereal mental cord that binds the consciousness of those departed from this world with those who remain? Is psychic phenomena a farce or fact? Let the Rosicrucians (not a religious organization), reveal the *satisfying truths* about these *mysteries of self* to you. Write for *free* introductory Sealed Book. Address:
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through absolute alcohol, clear in xylene and mount in balsam.

Celloidin sections should go from the 90% alcohol into beechwood creosote, then xylene and finally balsam.

The usual cause of failure is overstaining. Determine the proper time for duration of solution I by means of several trial slides or specimens, then decolorize for solution II by proper length of washing in the last of the 90% alcohols.

Results: connective tissues, including white or collagenous fibers, reticular fibers, cartilage, mucus and amyloid are stained in varying tints of blue; nuclei and cytoplasm of cells, axis cylinders of nerve fibers, neuroglia, fibroglia, fibrin and muscle are dyed red; elastic fibers pale pink to light yellow; myelin sheaths of nerve fibers, yellow; and red blood corpuscles orange. Unless the balsam used for mounting is rendered neutral this stain will fade after a while. To prevent this, many technicians keep a few small lumps of marble in the bottom of their balsam bottles, to neutralize acids that tend to form, and employ such a neutral balsam for all mounting purposes.

Trade Notes

For distribution this month to our readers we have an unusually interesting and instructive booklet, *Vitamins in Nutrition,* kindly made available through courtesy of Merck & Co., Inc., Rahway, N. J., one of the largest manufacturing chemical houses in the world. Consisting of 32 pages, 8 illustrations, table of vitamins, bibliography and detailed descriptions of the B complex, this pamphlet is valuable to teachers and all others interested in the subject. It is very well written and tells a story that should be known by everyone. To secure your copy, send a 3-cent stamp to Dr. Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St. N. W., Washington, D. C.

Advanced students of the industrial applications of the microscope will be especially interested in the publication of *Industrial Microbiology,* by Professors S. C. Prescott and C. G. Dunn, of the Massachusetts Institute of Technology. This scholarly text takes up the bacteria, yeasts and molds and considers their biology and chemistry with reference to the many industries in which they play important rôles. The nature and cultivation of microorganisms, conditions of fermentation, end-products and their biochemistry in the manufacture of alcohols, fats and acids are all thoroughly discussed and there are chapters on brewing, wines, distilling industries, cheese, silage, textiles, wood and many other products. Pp. x, 541; figs. 60. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York City. $5.00.

The Living Body is the appropriate title of a new human physiology by two noted medical scientists of the University of Toronto, Professors C. H. Best and N. B. Taylor. This is an excellent presentation, clearly and concisely written, very modern in content and methodology, splendidly illustrated, and thorough enough for all introductory needs, as that of the general reader or premedical student. The correlated anatomy, histology, pathology and apparatus are brought in only incidentally, the reader's attention being kept constantly directed upon function, yet he is never at a loss for a complete understanding of the physical basis, or how a given instrument works in deriving certain results. Pp. xxii, 563; 15 color plates; 283 figs. Henry Holt & Co., 257 Fourth Ave., New York City. $3.60.

Human anatomies are apt to be far too detailed and technical for readers other than medical students, but in the *Physiology and Anatomy* of Dr. Esther M. Greisheimer, now out in revised and reset fourth edition, we find a book which we can heartily recommend to anyone wishing this form of instruction. By means of 474 illustrations, 52 of which are in color, and including photographs, drawings, X-rays, charts, apparatus and physiological experiments, a great deal may be learned without recourse to dissection.

The plan of presentation is excellent. The entire subject is divided into five units: the body as a whole, the erect and moving body, integration and control by the nervous system, metabolism, and reproduction. With each system the anatomy comes first, including a wealth of material on histology as well as gross anatomy, followed by a second chapter on physiology. Each chapter concludes with a list of practical considerations, a feature we very much like. These consist of brief definitions and descriptions of environmental and pathological conditions commonly met with, hospital and clinical methods of examination, diagnosis and treatment, and other vastly interesting odds and ends. Pp. xiv, 822. J. B. Lippincott Company, Washington Square, Philadelphia. $3.50.

A book for the layman as well as the specialist is *The Story of Microbes,* by Paul W. Allen, Professor of Bacteriology in the University of Tennessee. Written as a story and not as a text or manual, and written simply and interestingly, there is yet no dearth of factual material or sacrifice of scientific approach. The author begins with the conviction that there are certain truths about bacteria that every person ought to know and without which it is not possible to be an intelligent citizen, and through biographies of the great names in this science, as Pasteur, Jenner, Koch and many others, and stories incorporating essential data regarding the main bacterial types, he develops a citizenship knowledge of how bacteria are tied up with the welfare and daily life of each of us. We recommend this for serious summer reading. John S. Swift Co., Inc., 105 S. Ninth St., St. Louis, Mo. $3.00.

McDougall's *Plant Ecology* has been thoroughly revised and published in third edition. New material has been incorporated without a corresponding increase in size, one aim being to keep the volume down to reasonable dimensions for an introductory text, to make it readable, and at the same time comprehensive. If you like botany and have never studied the factors that make plants grow and control where and how they grow in Nature, and the principles governing the structure and history of plant communities, then we believe you will find this book highly interesting and useful when you are in the field this summer. Just as one's enjoyment of the outdoors is increased by learning something about birds or butterflies, so with plant so cieties, the vegetal cities of prairie, deser meadow, shore or forest. To learn somethin of their structure and functions, their deve opment, problems and future outlook is add profoundly to your own mental equi ment. Pp. 285, figs. 118. Lea & Febige Washington Square, Philadelphia. $3.00.

The title of *Nature Recreation,* by Willia G. Vinal, while doubtless as good as a similar short phrase, fails to give one muc of an idea of the tremendous wealth of info mation contained in this fascinating volum It is many books in one; a personal guide a encyclopaedia for the Nature student a camper; an introduction to conservation; reference work for all outdoor group activ ties concerned with Nature study; and a tex book for teachers, parents, leaders and co munity officers concerned with organize Nature work. This book will be most stim ulating and useful for all who go to th outdoors when vacationing, and a great boo to everyone connected with supervision o instruction in wildlife, campcraft, field trip scouting, museums and other phases of th general field. McGraw-Hill Book Co., In 330 W. 42d St., New York City. $3.00.

Biologists sometimes let down their ha and indulge in lighter moments, wooing th muses. One such among our acquaintanc likes to try his hand at drama, while anoth is an invertebrate punster. On the other si are artists and composers who take a fli now and then in scientific provinces. If y would enjoy a hilarious collaboration of su gentry, try *Nature Smiles in Verse, A Colle tion of Bi-illogical Poems,* compiled by Be nal R. Weimer, Professor of Biology Bethany College, West Virginia. Here w be found such professional offerings as Jam J. Montague's "On Biologists;" Berton Br ley's "Botany," and Arthur Guiterman's "O to the Amoeba." Here too are scientists ta taliating, with poems by Robert W. Hegn H. H. Wilder and others; contributions graduate students, and excerpts from the cla sics in the Woods Hole Song Book. If the is a funny bone in your skeleton, you'll g a kick out of this little volume. Order fro the author; $1.50.

This summer try the following stunt. Ma a large and fairly deep cell by spinning a ri or cementing a glass ring to a slide. Put small drop of fairly thick balsam in t center of this cell and in this affix a captur lightning "bug", lying on his back. Obser at night in a dark room, with low powe Try placing bits of colored tissue paper acr the top of the cell, or use small squares colored cellophane.

The settings of ring stones, gold mes costume jewelry and many other ornament metallic objects are fascinating when se under low magnifications by reflected ligh Fine gold mesh as in ladies' bags, belts a bracelets reveals a marvelous pattern weave; stone settings that seem quite perfe to the unaided eye show gross imperfe tions; while the stones themselves, in che jewelry, seem crude indeed when magnifie